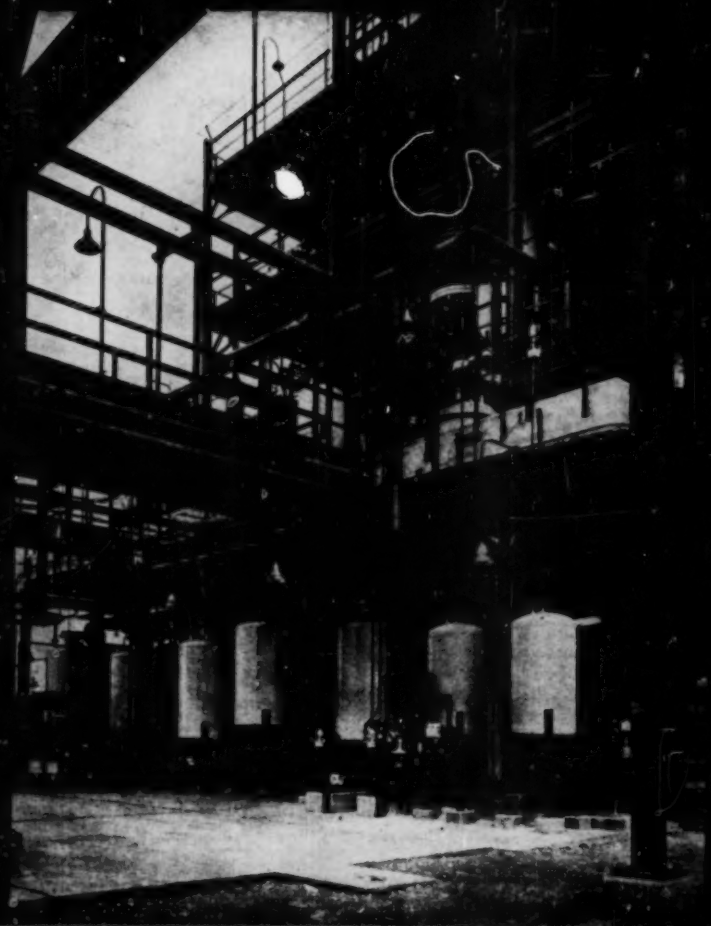
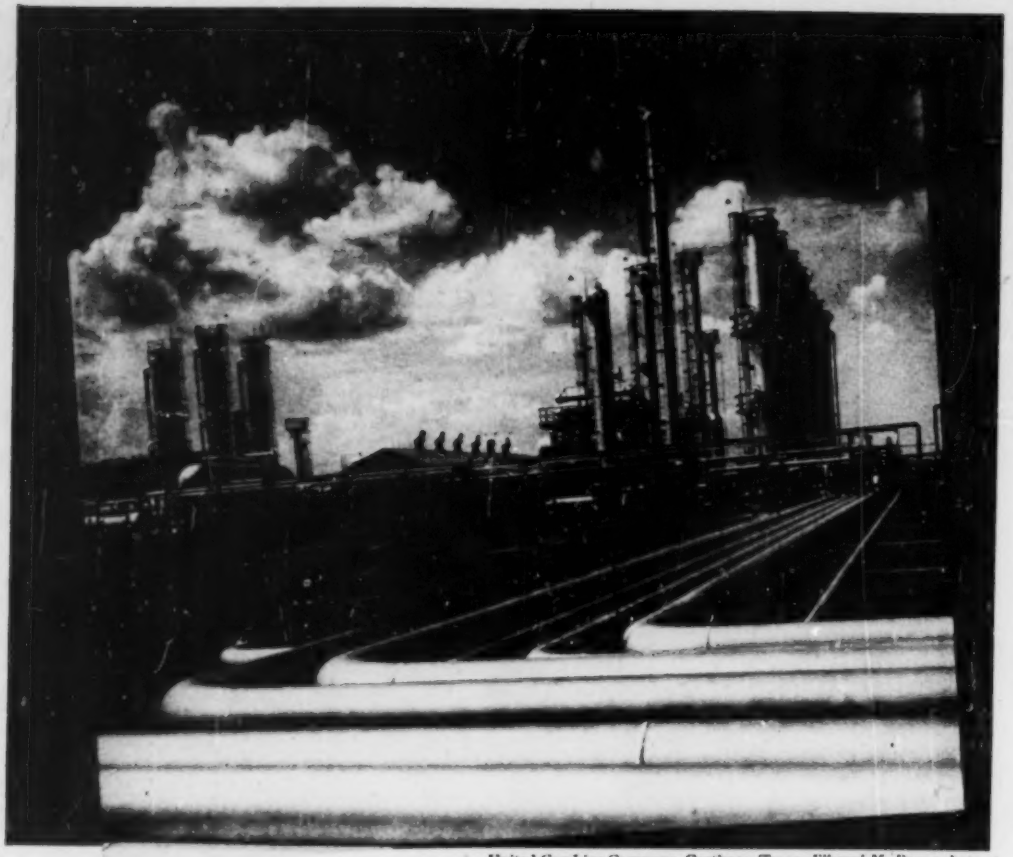
Chem. Eng.

Features: Organics from natural gas, new ideas for handling chlorine, thermodynamic properties of chlorine, universities' role in the nation's research, benefit plans for professional employees, how to avoid perchloric acid fires, sink-float processes, computing combustion volume for burning oil fuels, and sulphur burner for pH control.



Cover picture: Large-scale production of HCN by direct synthesis is accomplished by Rohm & Haas at Houston.

A McGRAW-HILL PUBLICATION



United Gas Line Company, Carthage, Texas. *Ellwood M. Payne* photo.

It'll still be new ten years from now

THIS piping at United Gas Line Company's plant is another sweetly streamlined example of leakproof permanence achieved with *the fittings that become part of the pipe.*

That means Tube-Turn welding fittings. They are preferred for large-scale piping that must remain safe and sound for years with little or no maintenance. Their butt-welded joints simply can't leak. Their forged-in strength equals or exceeds the strength of pipe. Their smooth inner walls and full effective radius minimize friction and erosion.

And yes, they are easy to install. Dimensional accuracy and true circularity make alignment a cinch. The absence of excess bulk permits compact, economical piping assembly.

For good service in good connections, deal with the Tube Turns distributor. He handles the biggest line of welding fittings.

TUBE TURNS, INC.

238 E. Broadway, Dept. D, Louisville 1, Ky.

District Offices at New York, Philadelphia, Pittsburgh, Chicago, Houston, Tulsa, San Francisco, Los Angeles

TUBE-TURN

tt

WELDING FITTINGS AND FLANGES

Write for the new and revised Tube Turns' chart of "Pipe and Fitting Materials". Covers ASTM and other specifications, chemistry, service temperature limits, welding data.

CHEMICAL ENGINEERING

WITH CHEMICAL & METALLURGICAL ENGINEERING

EDITOR.....S. D. Kirkpatrick
MANAGING EDITOR.....James A. Lee
ASSOCIATE EDITOR.....Theodore R. Olive
MARKET EDITOR.....Henry M. Batters
ASSISTANT EDITOR.....Edmond C. Fetter
ASSISTANT EDITOR.....Joseph A. O'Connor
ASSISTANT EDITOR.....Lester B. Pope
ASSISTANT EDITOR.....Richard F. Warren
ASSISTANT EDITOR.....Roger Williams, Jr.

Editorial Representatives

CHICAGO.....E. S. Stateler
HOUSTON.....J. V. Hightower
SAN FRANCISCO.....John R. Callaham
SAN FRANCISCO.....James F. Cosgrave
WASHINGTON.....D. O. Loomis
WASHINGTON.....R. S. McBride

PUBLISHER.....M. A. Williamson
SALES MANAGER.....L. E. Crist

District Managers

BOSTON.....W. D. Boyd
CHICAGO.....L. A. Cunningham
CHICAGO.....J. M. Rogers, Jr.
CLEVELAND.....Fred Grant
DALLAS.....J. H. Allen
NEW JERSEY.....E. H. Bedell
NEW YORK.....R. G. Frederick
NEW YORK.....A. D. Becker, Jr.
PHILADELPHIA.....E. M. Schellenger

WORLD NEWS DIRECTOR.....John Chapman
WASHINGTON OFFICE DIRECTOR.....G. Doying
ECONOMICS DIRECTOR.....Dexter Keezer

Volume 56 — January 1949 — Number 1

THIS MONTH

Let's Get Off Our High Horses—EDITORIAL FOREWORD 91

Organics From Natural Gas—J. V. HIGHTOWER 92

Sulphur Burner—R. C. ULMER, J. C. CHURCHILL 95

New Ideas for Handling Chlorine—J. V. HIGHTOWER 96

Thermodynamic Properties of Chlorine—R. E. HULME, A. B. TILLMAN 99

The University's Role in the Nation's Research—FREDERICK L. HOVDE 104

Sink-Float Processes—JOHN T. SHERMAN 106

Fume Disposal by Combustion—JOSEPH JARES 110

Perchloric Acid Fires—E. M. HARRIS 116

Benefit Plans for Chemical Engineers—A CHEM. ENG. REPORT 123

Organics From Natural Gas—A CHEM. ENG. PICTURED FLOWSHEET 132

Hydrochloric Acid vs. Materials of Construction—II—A SYMPOSIUM 231

Carbon Bisulphide—A COMMODITY SURVEY 317

EVERY MONTH

Book Reviews	295	Industrial Notes	256
Chementator	67	Manufacturers' Publications	155
Commodity Survey	317	Men, Machines and Methods	175
Convention Calendar	186	New Construction	324
Convention Papers	264	New Products	159
Corrections	206	News	183
Corrosion Forum	231	Personals	243
Economics	315	Pictured Flowsheet	132
Editorials	118	Plant Notebook	120
Equipment News	139	Price Trends	318
Foreign Abstracts	290	Production Trends	318
Foreign News	209	Production Data	320
Government Publications	302	Reader Service Coupons	146

An index to advertisers will be found on the fifth page preceding the back cover

Published monthly. Price, 50 cents per copy. Address communications about subscriptions to J. E. Blackburn, Jr., Vice-President (for circulation operations), Chemical Engineering, with Chemical & Metallurgical Engineering. Subscription rates—United States and possessions: $5 per year, $7 for two years, $9 for three years; Canada: $6 per year, $10 for two years, $12 for three years (payable in Canadian funds); Pan American countries: $10 for one year, $16 for two years, $20 for three years; all other countries: $15 for one year, $30 for three years. Please indicate position and company connection on all subscription orders. Chemical Engineering solicits subscriptions only from executives and engineers in companies in which chemical engineering and processing form an important part of the total operation, and from consultants and laboratories whose field includes such process industries.

Entered as second-class matter Sept. 3, 1936, at Post Office at Albany, N. Y., under act of March 3, 1879. Return Postage Guaranteed.

Copyright 1949 (all rights reserved) by McGraw-Hill Publishing Co., Inc.

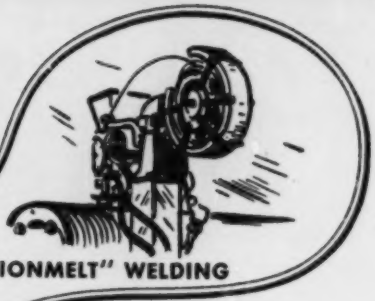
Publication Office: 99-129 North Broadway, Albany 1, N. Y. Editorial and Executive Offices: 330 West 42nd Street, New York 18, N. Y. Cable Address: McGraw-Hill, New York. James H. McGraw (1860-1948), Founder. James H. McGraw, Jr., President; Curtis W. McGraw, Vice President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation. Branch Offices: 520 North Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; Aldwych House, Aldwych, London W. C. 2; Washington 4; Philadelphia 3; Cleveland 15; Detroit 26; St. Louis 8; Boston 16; Los Angeles 14; Atlanta 3; Pittsburgh 22; Houston 2.

Member ABP; Member ABC.

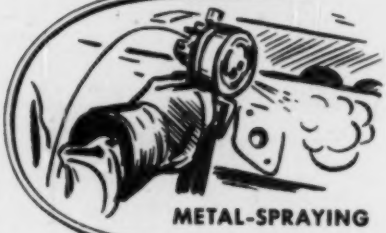
HASTELLOY Alloy Wire

TRADE-MARK

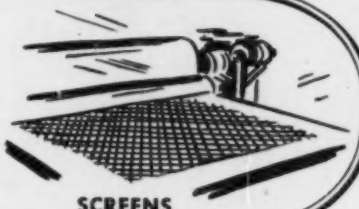
FOR METAL-SPRAYING, WELDING, and FABRICATED WIRE PRODUCTS



"UNIONMELT" WELDING



METAL-SPRAYING



SCREENS

HEAT-TREATING BASKETS

HASTELLOY nickel-base alloys, in the form of drawn wire, are available for the fabrication of corrosion-resistant screen, cloth, and baskets. The wire is also excellent for metal-spraying and for many types of automatic welding and hard-facing.

HASTELLOY alloys have a tensile strength comparable to that of the high-strength alloy steels, and possess unusual strength even at elevated temperatures. These alloys are specially designed to withstand the most severe conditions of chemical corrosion. Nickel-molybdenum alloy B is particularly resistant to hydrochloric and sulphuric acids, many organic acids, and all alkalies. Alloy C, a nickel-molybdenum-chromium-tungsten-iron composition, has excellent resistance to strong oxidizing agents, such as ferric chloride and wet chlorine, and is outstanding in its resistance to brine and salt spray.

In addition to HASTELLOY alloy wire, you can also obtain wire made of MULTIMET alloy—a cobalt-chromium-nickel composition developed for service at elevated temperatures.

Cut and straightened lengths or coils, in diameters down to 0.060 in., can be obtained directly from Haynes Stellite Company, Kokomo, Indiana. Wire in diameters less than 0.060 in. down to 0.002 in. is available from an associate company, Kemet Laboratories Company, Inc., Madison Avenue and West 117th Street, Cleveland 1, Ohio. For more complete information, write for a copy of the booklet, "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys."

HAYNES alloys

TRADE-MARK

The terms "Haynes," "Hastelloy," "Multimet" and "Unionmelt" are trade-marks of Units of Union Carbide and Carbon Corporation.

Haynes Stellite Company

Unit of Union Carbide and Carbon Corporation

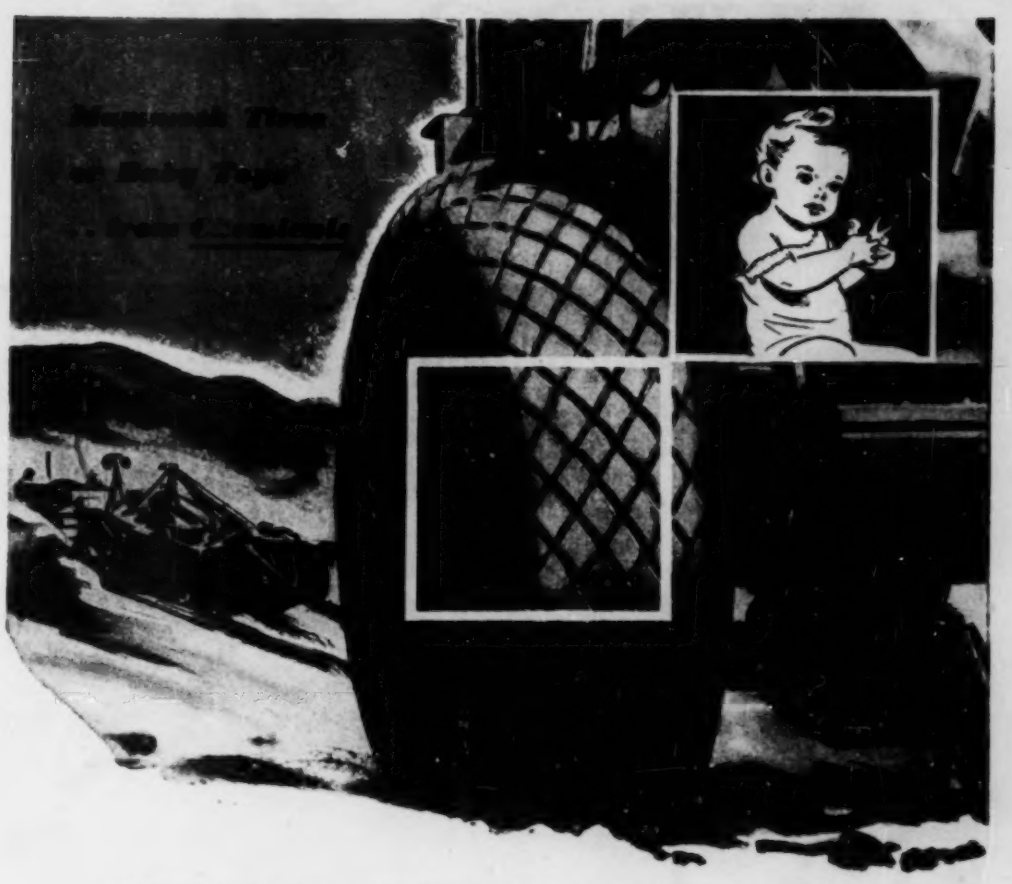
UCC

General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago—Cleveland—Detroit—Houston

Los Angeles—New York—San Francisco—Tulsa

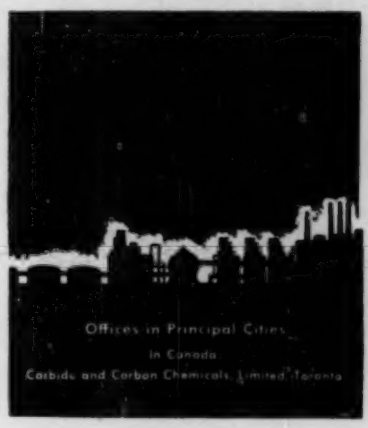


Thousands of products . . . from huge tractor tires to tiny-tot toys . . . are made partly or entirely from rubber. In the field of transportation . . . upon which all other industries depend for movement of goods and extension of markets . . . the importance of rubber is most apparent. Continued improvement in rubber products is made possible through rubber chemicals developed to meet new requirements.

Carbide and Carbon Chemicals, a pioneer in aliphatic chemistry and a supplier of over 200 industrial organic chemicals, continues to lead in research and development of new chemicals useful to the rubber industry. Among the chemicals we now produce for the rubber industry are aldehydes and amines for synthesis of rubber accelerators; rubber softeners; polyglycol and UCON lubricants; and butadiene.

• • •

For information on the chemicals we produce, call or write for "Synthetic Organic Chemicals," booklet B-1.

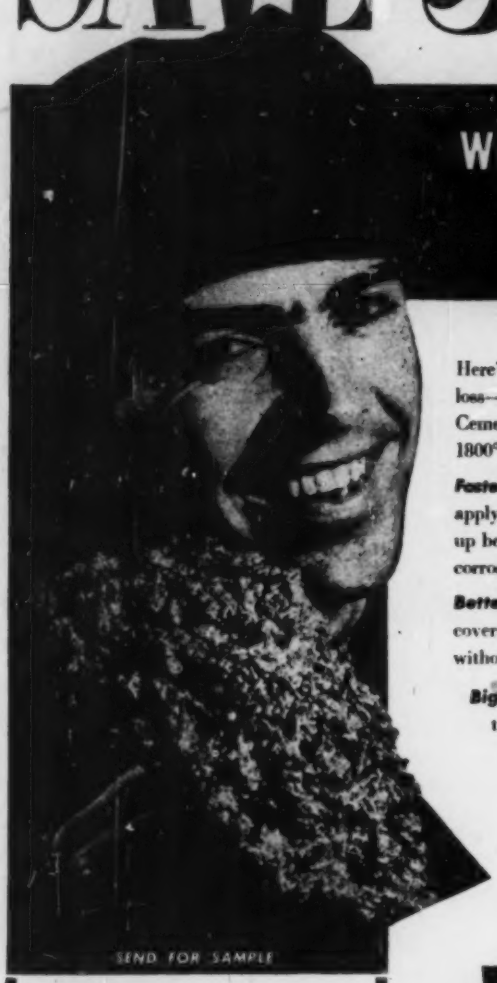


"Ucon" is a registered trade-mark of U. & C. C. C.

SAVE 3 Ways

with B-H No. 1 Cement

for insulating valves and other irregular surfaces



Here's the insulating cement that makes it practical to stop heat loss—even on areas that must be occasionally serviced. B-H No. 1 Cement is efficient, easy to use and resists temperatures up to 1800° F.

Faster to use. With B-H No. 1, you simply add water, mix and apply. *It sticks instantly!* It won't slide off bottom surfaces or roll up behind the trowel. Special rust inhibitor prevents pitting and corrosion.

Better coverage. B-H No. 1 is economical to use—with a wet coverage up to 60 square feet, 1-inch thick per 100 pounds! It dries without cracking or peeling. And it's reclaimable up to 1200° F.

Bigger heat savings. B-H No. 1 stops heat loss, even at high temperatures—because it's compounded of *black* Rockwool. For example, a 3-inch application reduces 800° F to 150° F.

There are hundreds of places where you can turn heat losses into profits with B-H No. 1 Cement. Send the coupon for descriptive literature and a working sample.

BALDWIN-HILL COMPANY
701 Broonig Avenue, Trenton 2, N. J.
Send free sample of B-H No. 1 Cement and 24-page data book "Industrial Relations."

NAME ..... POSITION .....

FIRM .....

ADDRESS .....

.....

Baldwin-Hill

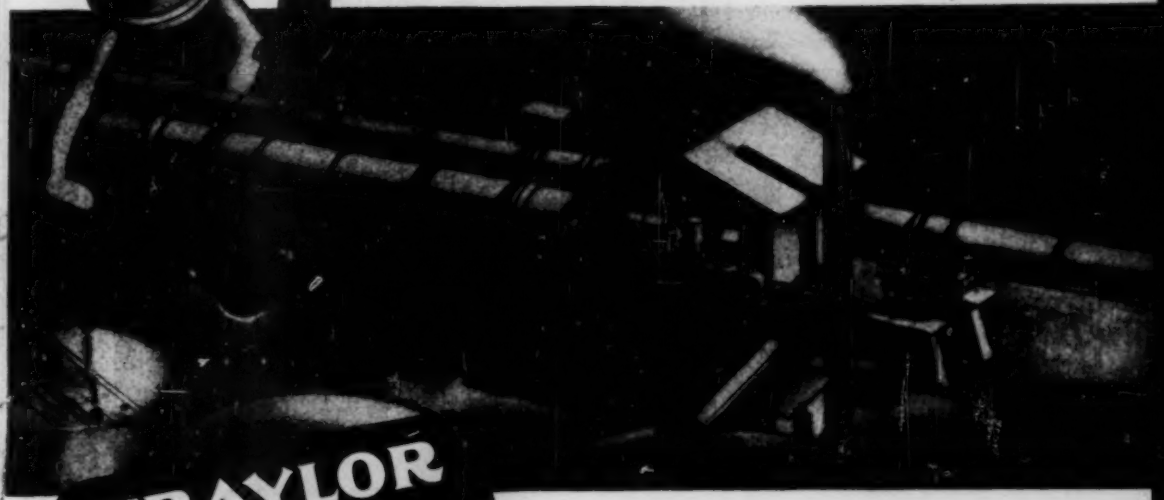
Specialists in Thermal Insulation

B-H MONO-BLOCK | B-H BLANKETS | B-H WEATHERSEAL | B-H FELTS

Making B.T.U.'s Behave

Every bit of information that will help Traylor Engineers design your kiln for the most profitable operation is carefully assembled and analyzed. Raw material . . . product characteristics . . . desired capacity . . . peak load anticipated . . . fuel available . . . space for installation . . . every conceivable angle of your problem is studied and solved.

The high efficiency of every Traylor Kiln is assured by such features as rigid, all-welded shell construction . . . reinforced circumferential joints . . . floating type riding rings . . . most suitable supports selected from a variety of proven designs—adequate provision for thrust, temperature variation in different zones and load changes.



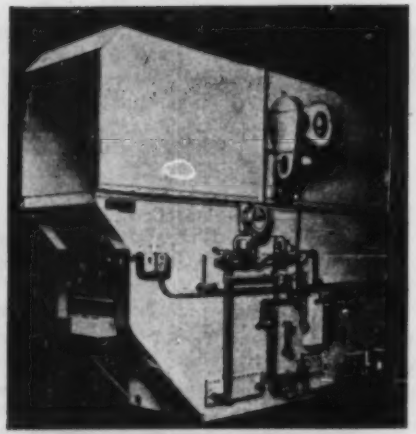
Write for complete information on the numerous structural advantages of Traylor Rotary Kilns and detailed accounts of many successful Traylor installations

TRAYLOR ENGINEERING & MANUFACTURING CO.
101 Mill Street, Allentown, Pa.
Canadian Mfr. Canadian Vickers, Ltd., Montreal, P.Q.
Sales Offices: New York, N.Y., Chicago, Ill., Los Angeles, Cal.

A "TRAYLOR" Leads to Greater Profits

Tough on the grease...

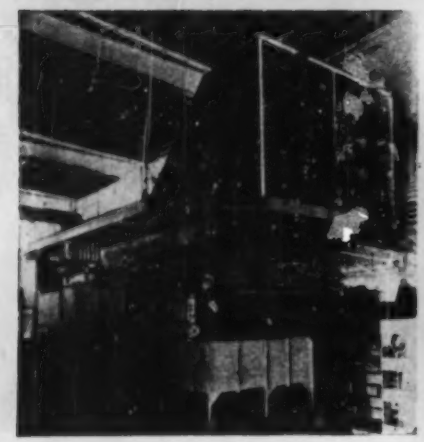
BUT EASY ON THE EQUIPMENT



Solvents employed in metal-cleaning remove grease in a hurry. Some solvents are highly corrosive. That is why Lukens Clad Steels with *extraordinary* corrosion-resisting properties are so widely used for this equipment today.

Nickel is able to withstand attack of warm, chlorinated solvents. Used as a clad steel, in which nickel is usually only 10% or 20% of total plate thickness, this corrosion-resistant metal takes the full brunt of the attack. The equipment shows *clad* steel economies although providing *solid* nickel performance.

Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—are available in plates as wide as 178". Specify the corrosion-resisting metal which meets your own degreasing requirements in a money-saving clad steel. For further data, write for Bulletins 255 and 338, Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.



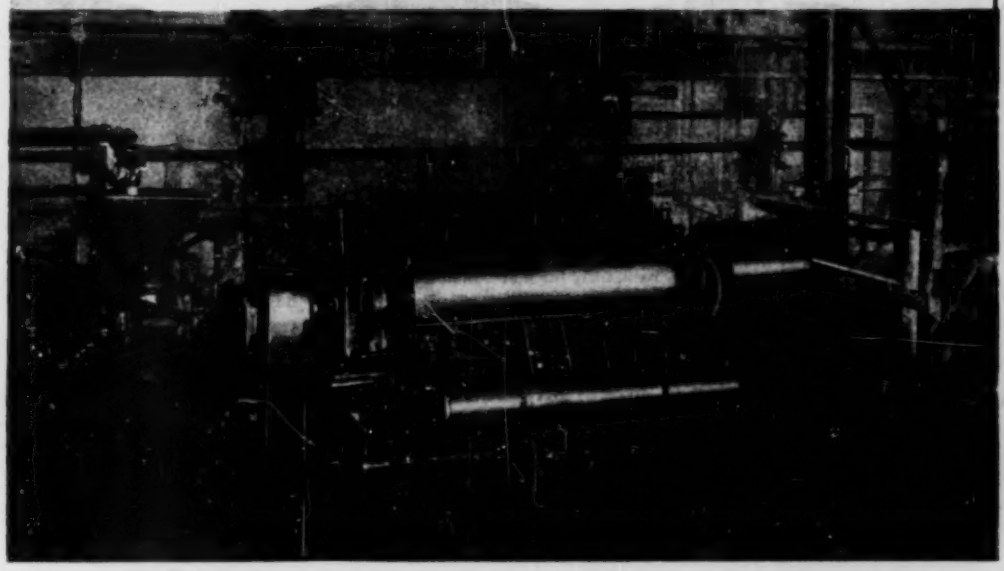
Small hand-operated tanks or huge vapor degreasers, all are made of corrosion-resisting Lukens Clad Steels.

LUKENS
Nickel-Clad · Stainless-Clad
Inconel-Clad · Monel-Clad
STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

00,000,000 Pounds of Salt Have Been Filtered by this Bird!



A half billion pounds — 250,000 tons — of sodium chloride has been separated from sodium hydroxide in this medium sized Bird Centrifugal Filter since it was installed nine years ago.

It is still going strong, running continuously 24 hours per day, 7 days a week.

Handling a feed of varying solids content, with liquor containing up to 25% caustic, the Bird produces a filter cake containing 5 to 7% moisture, as compared with the 12% or more formerly obtained. Using a very small amount of wash water, the cake carries less than 0.5% NaOH. It used to contain 2% or more.

Maybe *your* filtering job is different from, and more difficult than salt from caustic, but maybe the Bird can handle it to equal advantage and economy as it does in scores of other cases. It's worth finding out, isn't it?

BIRD MACHINE COMPANY, South Walpole, Mass.

BIRD

REVERE COPPER
and COPPER BASE ALLOYS
For Use With
LIQUID OXYGEN

★ ★ ★

COPPER and its alloys have long been favored by metal fabricators as materials of construction for pressure vessels, distillation columns, heat exchangers and other equipment for chemical plants. The ability of these alloys to be readily formed and easily joined by conventional methods, coupled with their good mechanical properties and high corrosion resistance, have made them preeminent in many applications.

However, the manufacturer of oxygen producing or handling equipment must consider more than the above-mentioned properties. He must insist that the materials used be immune to any adverse effects low temperatures may have. Many commercial alloys become increasingly brittle and lose their ability to withstand sharp blows as the temperature drops. But here again, there need be no worries with respect to copper and its alloys. Note the improvement at low temperatures in strength, ductility *and* resistance to impact for three copper base alloys:

Alloy (Annealed)	Temperature, °F.	Tensile Strength, psi.	Elongation, % in 2 in.	Impact Resistance—ft/lb, Izod Specimens
Deoxidized Copper	Room	31,400	48	43
	−292	58,000	38	50
Cupro Nickel, 30%	Room	70,800	41	90
	−292	112,700	51	97
Cartridge Brass, 70%	Room	51,100	49	66
	−292	73,500	75	79

(Tests on 0.25 in. diameter specimens)

Other Revere alloys, such as Herculoy (High-Silicon Bronze, A) show similar excellent properties at depressed temperatures.

Therefore, in designing oxygen plants, to play safe, specify copper-base alloys. Revere's Technical Advisory Service will be glad to assist in the selection of the proper alloys to meet your requirements.

REVERE

COPPER AND BRASS INCORPORATED

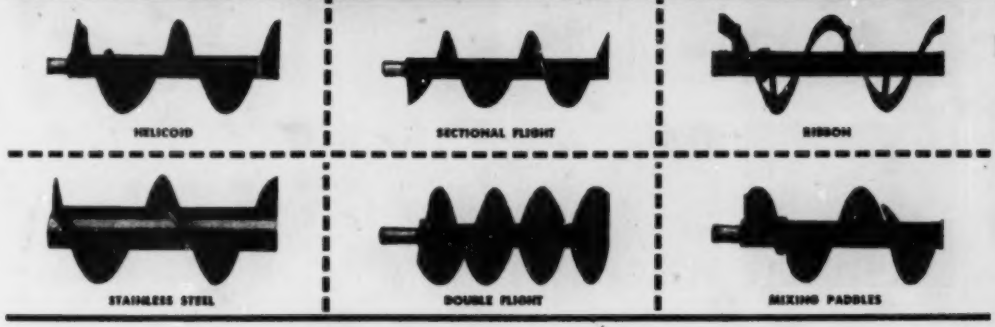
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

Efficient Low-Cost
LINK-BELT Screw Conveyors
Reduce Handling Costs of Bulk Materials



• Screw Conveyors have a wide variety of applications. Also there are many types of screw conveyors. Selection of the proper type is of utmost importance to you, to give you the full advantage of their simplicity, compactness, efficiency, convenience, durability, and clean, dust-tight, trouble-free operation. Submit your problem to "screw conveyor headquarters" for an unbiased recommendation.

COMPACT: take less space than other types of conveyors; no return run.

DUST-TIGHT: tight covers and joints, dust seals and Link-Belt cover clamps keep dirt out, keep dust inside.

SIMPLE: no elaborate chutes, skirting, etc.; simple loading spout enables conveyor to regulate input of material to its carrying capacity.

ECONOMY: first cost, installation, and maintenance are all low; and Link-Belt screw conveyors can be made as durable as necessary for the materials handled.

11.338

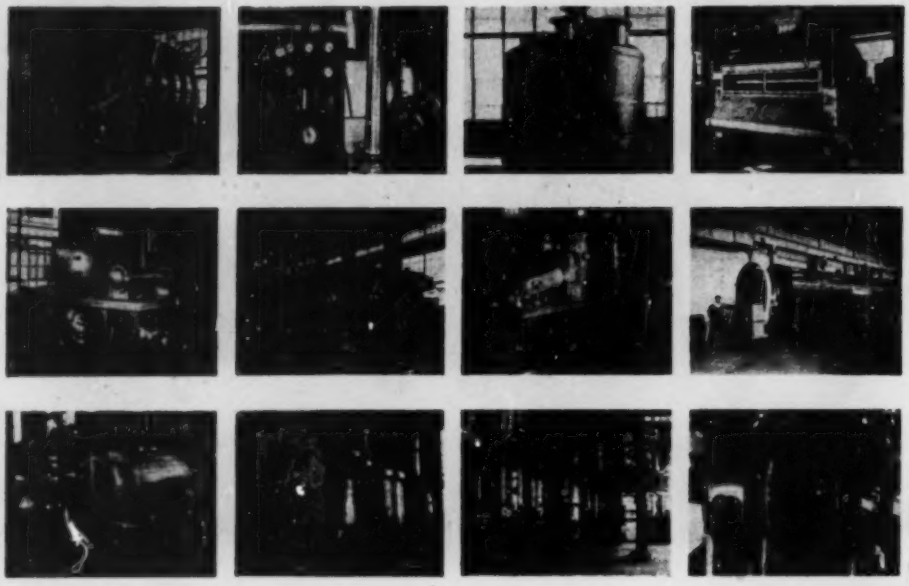
LINK-BELT COMPANY Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT SCREW CONVEYOR

COLLARS · COUPLINGS · HANGERS · TROUGHS · BOX ENDS · FLANGES · THRUSTS · DRIVES

1949

Can Be The Year You Saved Most In Process Production!



BUFLOVAK Equipment leads to economical and profitable Chemical and Food Processing. By maintaining high product quality at low production cost, BUFLOVAK assures you real savings.

Illustrated are some of the BUFLOVAK equipment. The complete line includes Dryers, Evaporators and Processing Equipment for foods and chemicals. Savings are reported by users in plants everywhere. It's advanced engineering plus modernized construction that does the trick. By using BUFLOVAK you, too, can fatten the piggy-bank of profits.

Complete information is available on all the units shown here. We invite you to write today for full data and learn the many exclusive features offered you by BUFLOVAK.

Let us tell you also about our complete and up-to-date Research and Testing Laboratories that can study your processing problems and tell you the complete results of your contemplated process before you begin actual operation.

BUFLOVAK EQUIPMENT

Division of Blaw-Knox Co.

1551 FILLMORE AVE. BUFFALO 11, N. Y.

You get MORE CAPACITY with a FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

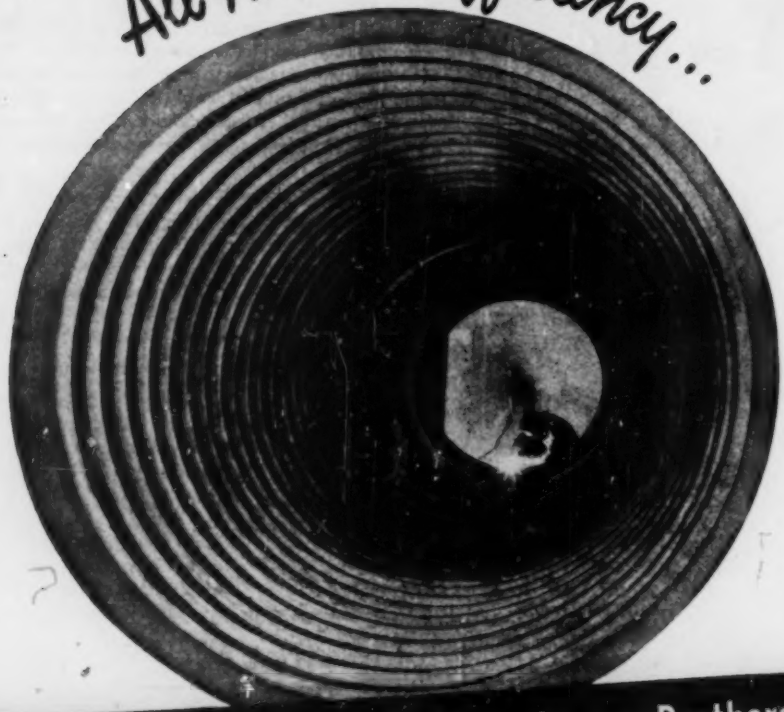
FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

Get the Whole Story

Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

COPPUS ENGINEERING CORP.
221 Park Ave.
Worcester 2, Mass.
Please send Bulletin 410-6 to:
Name .....
Company .....
Address .....
City ..... Zone ..... State .....

All-Around efficiency...



with ALL-WELDED ALUMINUM by Stacey Brothers

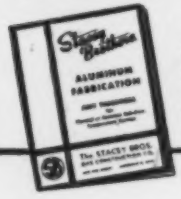
All-aluminum vessels can cut many a processing cost—by cutting maintenance and replacement expense.

The key to such savings is thick-section (up to 3") aluminum welding. Stacey Brothers has that key—ready to place at your disposal. We are equipped to handle your requirements for all-welded aluminum pipe and made-to-order fittings 12" diameter and over; and special vessels are a proved product at Stacey Brothers—with applications limited only by your needs.

We have complete facilities for aluminum brazing, Argon-shielded tungsten arc welding, tube rolling and x-raying. We've developed a water-cooled torch with special nozzles to permit maneuvering into position to maintain the proper arc length—another example of Stacey Brothers know-how that pays off in trouble-free performance for you.

If durability, freedom from corrosion, or improved physical structure at low temperatures would increase the efficiency of the equipment you need for processing and storage, it will pay you to investigate the *new* possibilities available through aluminum. May we quote on your fabrication requirements?

STACEY BROTHERS GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 VINE STREET • CINCINNATI 16, OHIO



● Write for your copy of this interesting new bulletin, explaining our facilities and illustrating our experience in the field of aluminum fabrication. Ask for Bulletin A-48.

Stacey Brothers
METAL FABRICATORS

A valve is a valve, is a valve, is a valve

...or is it that simple?

A certain famous authoress would have expressed the belief of some valve buyers by saying: "A valve is a valve, etc." At least it seems so from the off-hand manner in which they shop around for low price without due regard for quality and its effect on ultimate cost.

Low-priced valves can be a mighty expensive luxury in the long run, especially in corrosive-fluid pipe lines. Even among valves made of corrosion-resistant alloys, there can be a substantial difference among the life-expectancies of different makes. The "know-how" of the manufacturer makes the difference. For best results, specialization backed up by seasoned experience in design, metallurgy and fabrication of corrosion-resistant alloys, is essential. All of this is included in Aloyco Valves because this Company has concentrated all of its attention on this one type of product throughout its entire business existence. Let us discuss your requirements.

Aloyco Globe Valve No. 311. Stocked in Aloyco 20, 18-8S and 18-8Mo. Available in other alloys on special order.

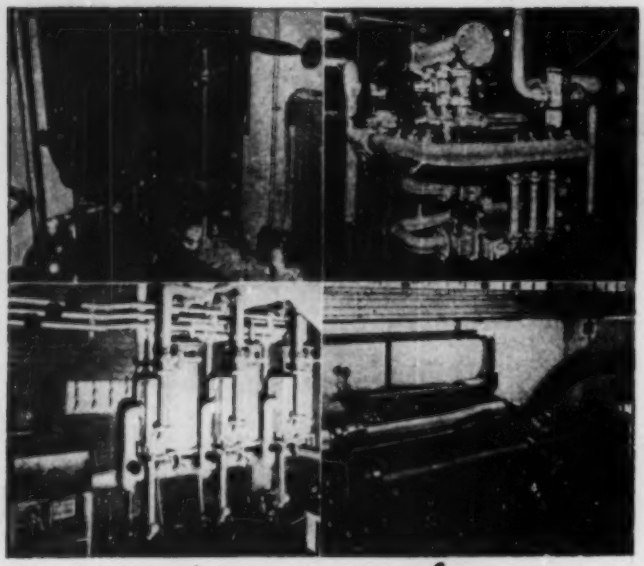
Aloyco Sampling Valve No. 731—Flanged End.

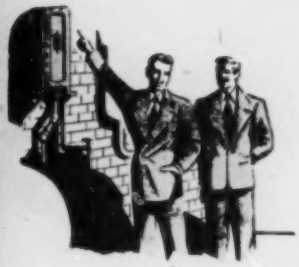
Aloyco Needle Valve No. 40-N.

ALOYCO

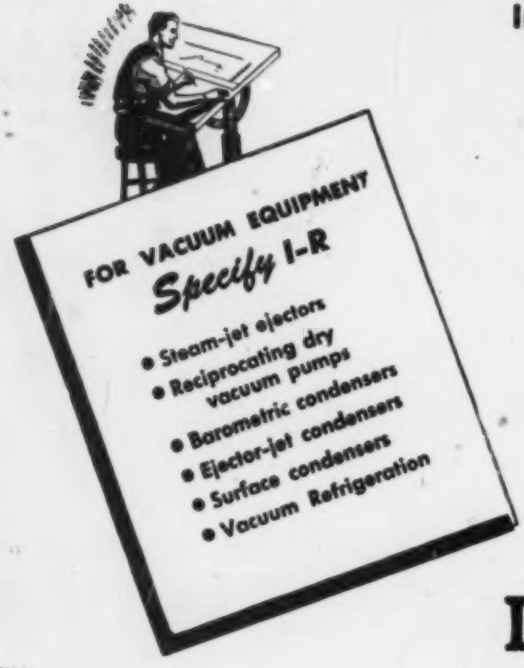
STAINLESS STEEL VALVES AND FITTINGS

ALLOY STEEL PRODUCTS COMPANY, INC.





Vacuum Specialists



Ingersoll-Rand has them . . .

In chemical and food industries where vacuum equipment is an essential part of many highly technical processes, Ingersoll-Rand has the engineering know-how.

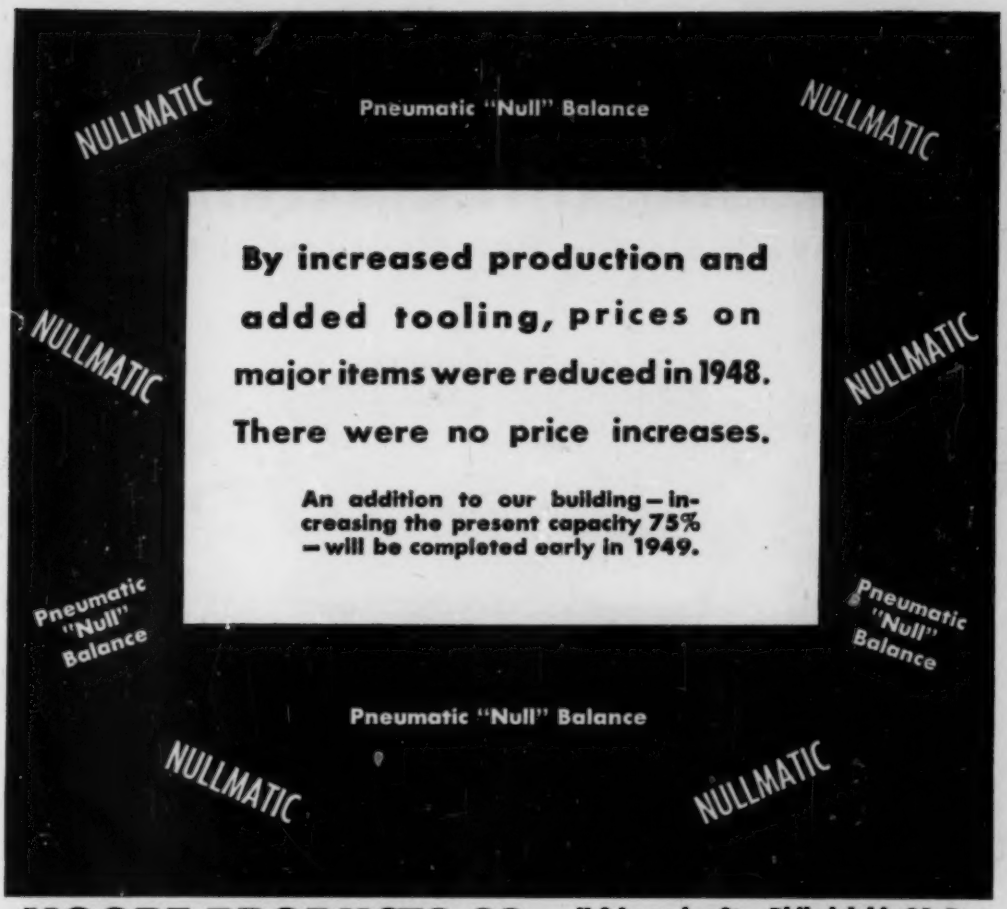
You will find trained engineers in Ingersoll-Rand branch offices who are vacuum specialists. They are constantly working with process engineers who are finding new and better ways to make vacuum equipment speed up processing time . . . improve product quality . . . reduce costs.

If you are looking for the answer to a vacuum problem, why not take advantage of the experience of Ingersoll-Rand engineers? They can show you how the correct application of I-R vacuum equipment is producing effective results in chemical and processing plants manufacturing a wide variety of products.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

164-4

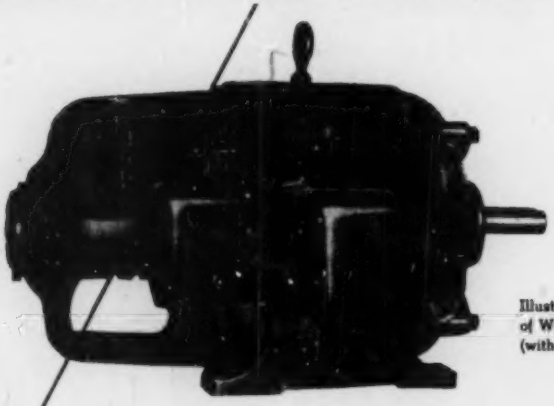

NULLMATIC
Pneumatic "Null" Balance
NULLMATIC
By increased production and added tooling, prices on major items were reduced in 1948. There were no price increases.
An addition to our building — increasing the present capacity 75% — will be completed early in 1949.
NULLMATIC
NULLMATIC
Pneumatic "Null" Balance
Pneumatic "Null" Balance
Pneumatic "Null" Balance
NULLMATIC
NULLMATIC

MOORE PRODUCTS CO., H & Lycoming Sts., Philadelphia 24, Pa.
DETROIT CHICAGO HOUSTON PITTSBURGH

Century

WOUND ROTOR MACHINES

Are Available for *MANY* Industrial Uses . . .



Illustrating Century Line of Wound Rotor Machines (with covers).

For *Compressors • Cranes • Hoists • Bending Rolls • Refrigerators • Bridges • Synchro-Speed Drives • Printing Presses • High Frequency Current*

Century Polyphase Wound Rotor machines are adaptable to many applications that require

1. Adjustable varying speeds or reversing direction of rotation — such as bending rolls, fans and blowers, newspaper printing presses, etc.
2. Synchro-speed, multiple drives to be used when two or more industrial operations must be synchronized.
3. Converters — to supply high frequency current for high speed electric motor-driven machines and hand tools.
4. High starting torque with low starting current — for such applications as cranes, hoists, lift bridges, turn tables and car dumps.

Century Electric Wound Rotor Machines are built in sizes up to 400 horsepower and are available in open protected or splash proof frames.

Century builds a complete line of electric motors in a wide range of types and kinds, in sizes from 1/6 to 400 horsepower.

Century C MOTORS

Specify Century motors for all your electric power requirements.

Popular types and ratings are available from factory and branch office stocks.

CENTURY ELECTRIC COMPANY • 1806 Pine St. • St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

CE-603

You are looking at...

This giant extruder is over 30 feet in length. Its 20-inch diameter screw is 17 feet long.

This giant in the standard series of Farrel-Birmingham extruders is over 30 feet long, and the screw contained in the five-section cylinder is 20 inches in diameter and 17 feet in length.

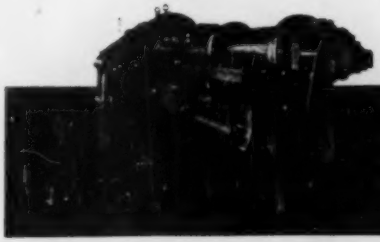
The machine receives raw material in a continuous flow through a rectangular hopper in the first cylinder section. From here the stock is worked and forced forward by the screw through a perforated plate before passing through the downward discharge die.

Both screw and cylinder are hard-surfaced and cored for the circulation of temperature-controlling fluid. The swinging die head has a hydraulically operated bayonet-type lock. The overall construction, which combines the use of Meehanite metal and steel, is extremely heavy and rugged to permit high-pressure operation.

Farrel-Birmingham extruders are available in 6", 8½", 12", 15" and 20" screw diameter sizes for processing rubber and plastics. *Write for complete information.*

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston.



FB-488

Farrel-Birmingham

"STAINLESS STEEL cuts our replacement costs..."

—say varnish plant executives

1600 pounds of synthetic resin are melted down to 375 gallons of varnish in these stainless steel kettles. Some have been used for as long as seven years, yet none has required any mechanical maintenance. Secondary benefits are: increased capacity over the material formerly used, due to stainless steel's high structural strength . . . lack of tendency to discolor . . . and, ease of cleaning.

Enthusiastic comments by actual users are convincing evidence of the substantial savings in replacement costs which follow the installation of ENDURO Stainless Steel equipment.

Because ENDURO belongs to the alloy steel family—toughest of metals—it resists all forms of rough use and abuse . . . provides hard, long-wearing surfaces. And, because those surfaces are unsurpassed in their resistance to rust, corrosion and heat, ENDURO greatly outlasts ordinary materials . . . is ideal for all types of processing equipment.

Add the facts that stainless steel is easy to clean and keep clean . . . never requires refinishing . . . retains its high structural strength at elevated temperatures . . . and it's easy to see why more and more processors in the chemical, pharmaceutical and food fields are specifying ENDURO on new equipment orders. For complete details, see your fabricator, or write to:

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL

Enduro Reg. U.S. Pat. Off.

STAINLESS STEEL

RESISTANT TO RUST AND CORROSION • RESISTANT TO HEAT • HIGH IN STRENGTH • EASY TO FABRICATE
EASY TO CLEAN • FREE FROM CONTAMINATION • EYE APPEALING • LONG LASTING • LOW ULTIMATE COST

A PRODUCT OF REPUBLIC STEEL

From SHELL CHEMICAL

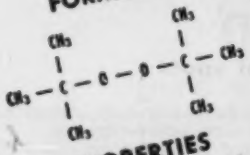
...in commercial quantities

A new, exceptionally stable polymerization catalyst of high purity

Di-Tertiary-Butyl Peroxide

...for resins of finer color and clarity

FORMULA



PROPERTIES

Molecular Wt.	146.22
Boiling Pt. (740 mm)	111°C
Spec. Gravity 20°/4°C	0.800
Refr. Index, n_D^{20}	1.389
Flash Pt. (Tag Open Cup)	65°F
Solubility in water, 20°C (wt.%)	<0.1%

Among the many other products manufactured by Shell Chemical are Methyl Isobutyl Ketone, Methyl Isobutyl Carbinol and Acetone.

DI-TERTIARY-BUTYL PEROXIDE offers resin manufacturers an exceptionally stable polymerization catalyst *with a purity of 97%*. This new, liquid organic peroxide is insensitive to shock. It can be stored for long periods of time at temperatures up to 80° C. without change in composition or danger of explosion. Because of this stability, DTBP can be safely handled in far higher concentrations than most peroxides.

Activation is governed solely by temperature and is independent of the reaction media. This permits very accurate control of quality during polymerization reactions. Resins of superior color and clarity are obtained because splitting of DTBP into free radicals—which initiate chain polymerization—does not leave any harmful residues.

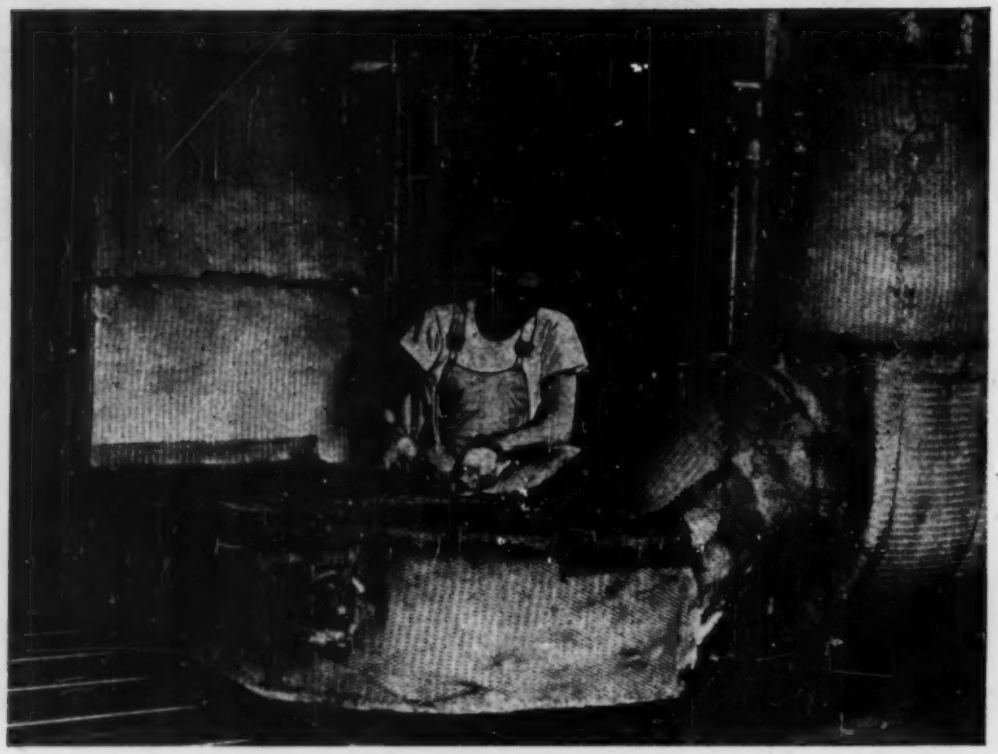
DTBP is soluble in most resin-forming monomers. It is an effective catalyst in polymerization reactions carried out at temperatures above 100° C.

DTBP is now available in commercial quantities.

A letterhead request to any Shell Chemical district office listed below will bring you technical literature and a sample.

SHELL CHEMICAL CORPORATION

100 Bush Street, San Francisco 6 • 500 Fifth Avenue, New York 18
Los Angeles • Houston • St. Louis • Chicago • Cleveland • Boston • Detroit



FIBERGLAS*

...a star performer in industry's hot spots

Wherever you find hot spots—those "we-can't-afford-heat-loss" points in the plant—you'll find Fiberglas Insulating Blankets right for the job.

Why? Because they save installation time, they save fuel—and they save money. That's the proved-in-use experience at many of the country's important plants—on industrial ovens, boilers, ducts, breachings, retorts—and a long list of specialized processing equipment.

The high thermal insulating efficiency of Fiberglas results from the countless tiny air spaces enclosed in a lightweight, wool-like blanket of long, fine fibers of glass. Here is a material that will not burn, rot or decay—is non-corrosive and will not corrode metals. Fiberglas insulation holds together, is resilient, will not settle under vibration.

This basic material is further processed into blankets that meet the requirements of industry for insulating hot surfaces up to 1000° F. In the illustration, Fiberglas Insulation has been fabricated with a metal mesh exterior surface to facilitate application and provide a base for insulating and finishing cements.

Get all the facts about Fiberglas blankets—their many forms and uses. Write for "Fiberglas Insulations for Industry" . . . Owens-Corning Fiberglas Corporation, Dept. 950, Toledo 1, Ohio. Branches in principal cities.

In Canada: Fiberglas Canada Ltd., Toronto, Ontario

OWENS-CORNING
FIBERGLAS
THERMAL INSULATING MATERIALS

*FIBERGLAS is the trade-mark (Reg. U. S. Pat. Off.) for a variety of products made of or with glass fibers by Owens-Corning Fiberglas Corporation

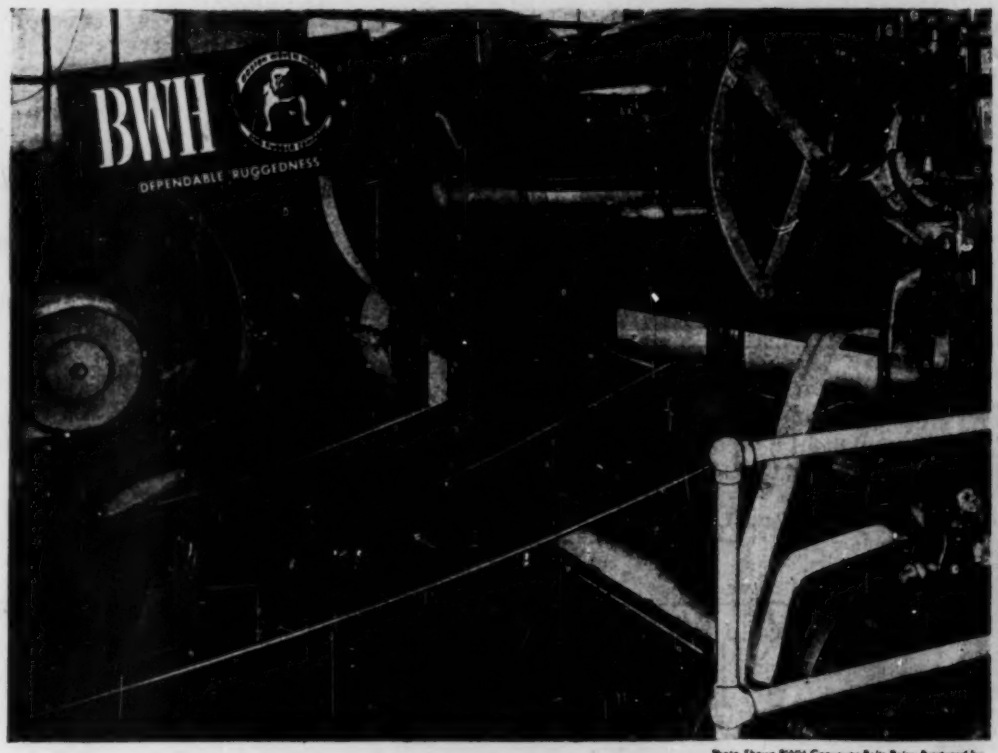


Photo Shows BWH Conveyor Belts Being Produced by the ROTOCURE Process of Continuous Vulcanization.

ONLY BWH BELTS

give you all the advantages of the ROTOCURE Process of Continuous Vulcanization

Industrial users have long recognized the potential faults in belts made by the old flat press process. By this method of vulcanizing, successive 30-foot segments of uncured belts are inserted in the flat press, stretched and vulcanized. Of necessity, the joints are overlapped in the press, resulting in overcuring. This may cause operational weakness in the belt.

15 years of tough, on-the-job testing has definitely proved that belts made by the famous ROTOCURE Process have many distinct advantages over flat-press cured belts, resulting in increased operating efficiency and lower maintenance costs.

Among these advantages are the following:

1. ROTOCURE eliminates press overlaps or overcured segments, through continuous vulcanization. Actual tests prove press overlaps may reduce flex-life as much as 40%.

2. ROTOCURE eliminates mechanical distortion, which occurs at the press ends in the flat-press method of curing.

3. ROTOCURE eliminates uneven stretch, because this process maintains constant, uniform stretch control throughout the curing of every inch of BWH Belts.

4. ROTOCURE eliminates from transmission belts, the dusting agents necessary in flat-press curing to keep belts from sticking to hot platens. Thus BWH Transmission Belts have a higher coefficient of friction, resulting in lowered operating tensions . . . prolonged belt life.

5. ROTOCURE eliminates non-uniform covers in conveyor and elevator belts, because this process never overcures any part of the belts. Thus the rubber covers of BWH Conveyor and Elevator Belts are uniformly abrasion-resistant.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1021, BOSTON 3, MASS.

CUSTOM-BUILT EQUIPMENT
For the Chemical and Food Processing Industries

KELLEY
STAINLESS STEEL
Fabrication

ACID PLANTS
★
CHEMICAL PLANTS
★
PAPER AND PULP MILLS
★
RAYON PLANTS
★
TEXTILE PLANTS
★
PETROLEUM REFINERIES
★
BLEACH AND DYE HOUSES
★
BEVERAGE DISPENSERS
★
BREWERIES
★
DAIRY PLANTS
★
FOOD PLANTS
★
MEAT PACKING PLANTS

ONE UNIT OR CARLOADS

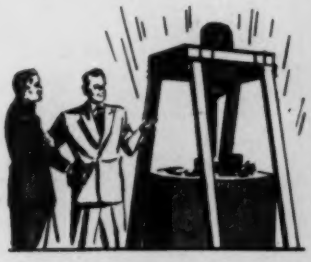
O. G. KELLEY & CO.

94 TAYLOR STREET, BOSTON 22, MASS.

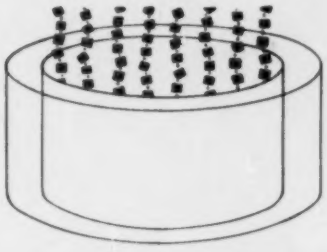
NEW YORK N. Y. | JOHNSON CITY TENN. | ELIZABETH N. J.

"My Plant Stunk!"

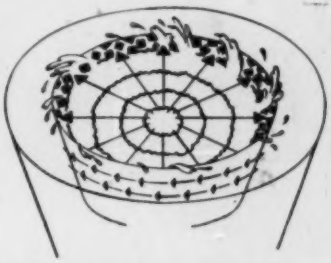
In processing animal food, protein was extracted from fish scraps by acid treatment in settling tanks. This method wasted time, space and material . . . and the odor was highly offensive . . .



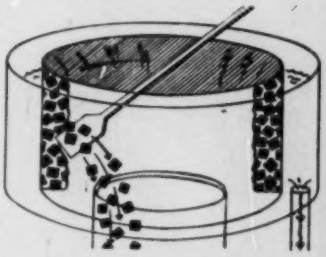
An AT&M engineer solved this problem with a completely enclosed centrifugal having a rubber-covered corrosion-resistant basket.



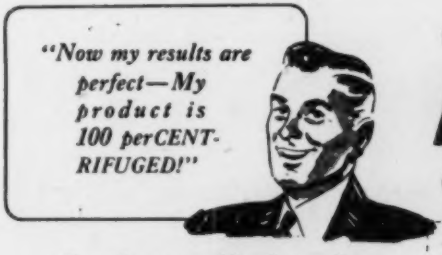
The fish scraps are loaded into the basket with acid added.



When acid has broken down the scrap, centrifugal force whirls the liquid over the basket top, leaving a residue of protein.



Thus converted to a palatable live stock feed, protein is plowed out. Further processing of the effluent and a second cycle yields calcium for poultry feed if desired. Results: Faster processing in less space — waste eliminated — odors eliminated!



SAVE TIME, SPACE AND COSTS WITH

A.T. and M. CENTRIFUGING

If you have a problem just mail the coupon — no obligation

Numerous case studies like this offer convincing proof that AT&M centrifuging saves time, space and money. A cost comparison of your present processing methods with centrifuging will gladly be made by our engineers without expense to you. Mail the coupon to AMERICAN TOOL AND MACHINE COMPANY, 1415 Hyde Park Ave., Boston 36, Mass.; 30A Church Street, New York 7, New York.

AMERICAN TOOL & MACHINE COMPANY
1415 Hyde Park Ave., Boston 36, Mass.

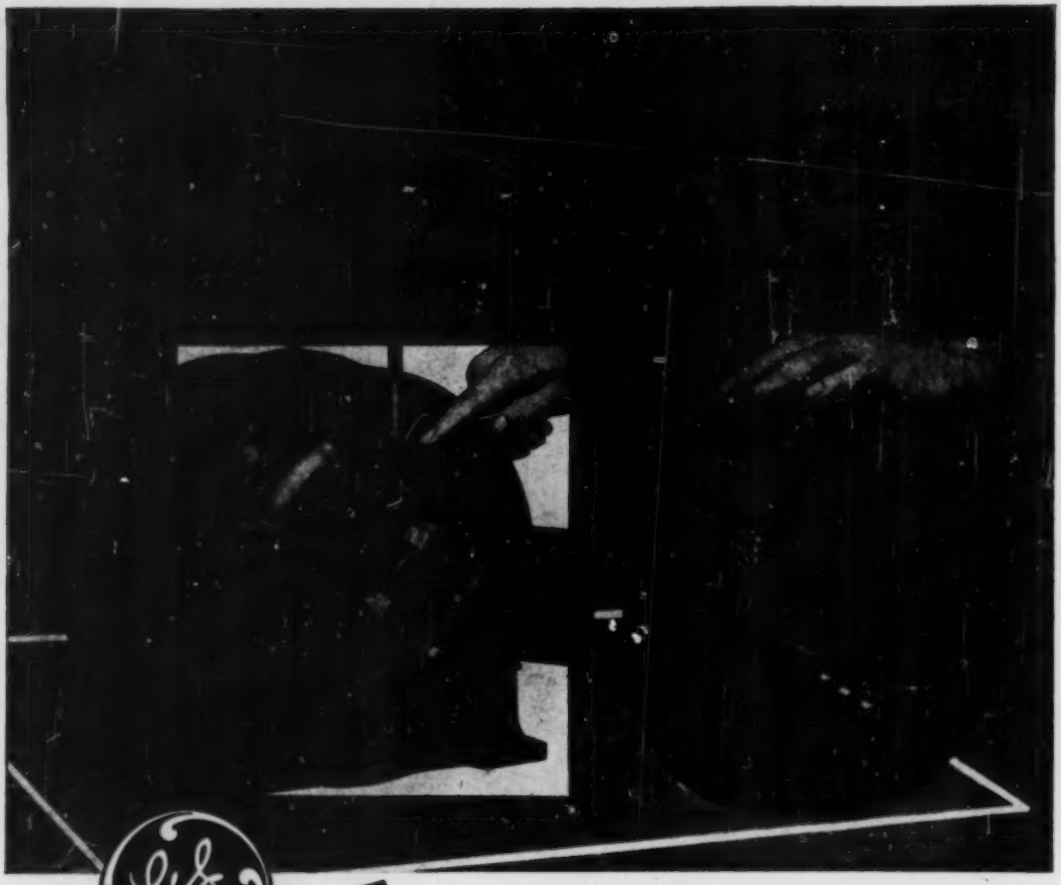
Please send information on centrifuging applied to the following processes:
☐ Extraction ☐ Filtration ☐ Dehydration ☐ Coating ☐ Precipitation
☐ Sedimentation ☐ Impregnation

Write here any other process.....

Name.....

Company.....

Address.....



TRI CLAD

Totally Enclosed Fan-Cooled

MOTORS

for

Chemical Plants

Non-sparking . . . Fully explosion-proof!

Exhaustive tests under low humidity and varying dust conditions prove conclusively that Textolite is non-spark producing and accumulates no static electricity. This feature is essential for the external fan of a totally enclosed fan-cooled motor operating in a hazardous atmosphere.

Tested and listed by UL for use in hazardous areas!

Explosion-proof Tri-Clad motors with the new Textolite cooling fan are listed and labeled by Underwriters' Laboratories, Inc. for use in hazardous areas listed as Class I Group D (atmospheres containing petroleum, naphtha, butane, propane, alcohols, acetone, lacquer solvent vapor, and natural gas), and Class II Groups E, F, and G (metal dust, coal or coke dust, and grain dust).

SUCH CORROSION DEFENSE *in a standard motor!*

NEW G-E TEXTOLITE COOLING FAN

—plus famous Tri-Clad cast-iron construction—makes available a standard totally enclosed fan-cooled motor for corrosive chemical-plant service

Here, for the first time, is a *standard* motor that is not affected by chemical-plant conditions, regardless of the type of acids, alkalies, or solvents encountered!

General Electric's new development—the corrosion-resistant fan of Textolite®—is now available, off the shelf, in *all* Tri-Clad totally enclosed fan-cooled motors in ratings from 1 to 15 hp. For years, Tri-Clad motors, with the extra protection afforded by their cast-iron double-wall frame and end shields, have been popular standards for the industry. And now, the addition of this new corrosion-resistant fan as a regular construction feature ends the need to specify special modifications on smaller motors to meet the tough service requirements of a chemical plant.

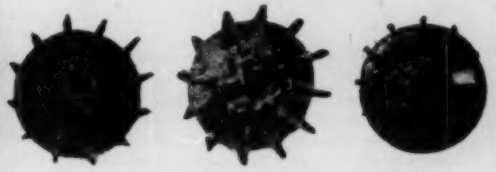
Introduced after a year of rigorous laboratory testing, the improved cooling fan is made in a unique design from Textolite, a tough G-E material. Inert to most corrosives commonly met in chemical plants, it is far superior to commonly used metals which too often corrode in certain adverse atmospheres.

Good for 15,800 rpm!

Textolite fans stand up under centrifugal force. Tests showed a one-pound, 8-inch diameter Textolite fan would operate as high as 15,800 rpm. This provides an ample factor of safety over normal operating speeds of 1800-3600 rpm.

The new Textolite fan adds another plus to the famous extra protection you get with Tri-Clad motors: extra protection against physical damage, electrical breakdown, and operating wear and tear. Send for the new Bulletin GEA-5094 on Tri-Clad totally enclosed fan-cooled motors equipped with Textolite cooling fans for a full description of this new development. *Apparatus Department, General Electric Co., Schenectady 5, New York.*

TESTED BY TORTURE: Tests that proved the resistance of Textolite to chemicals and corrosive atmospheres included the torture chamber above. Pairs of Textolite, coated metal, and uncoated metal fans were revolved on a shaft at a high ambient temperature, with acid or caustic spray directed continuously at the blades for 500 hours. This test is far more severe than any to be met in actual service.



WITHSTANDS 500 HOURS' ORDEAL! Unretouched photo shows a typical group of fans after having been subjected to a 500-hour test under hydrochloric acid spray. Note that the metal sample on the left is nearly destroyed. The coated fan in the center is partly eaten away, particularly at the outer edges of the blades. The Textolite fan, right, almost entirely unaffected by the highly corrosive acid, is good for many years of service on a motor.

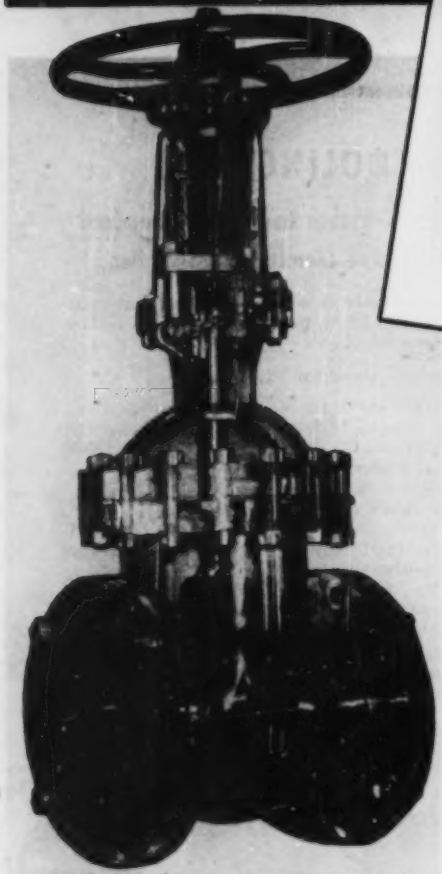
GENERAL ELECTRIC

660-69

THE *Inside Story* OF

OIC

PACE-SETTER IN VALVES



OIC'S FAMOUS PLASTIC TRANSPARENT VALVE has traveled the country from one exhibition to another showing plant engineers everywhere the exclusive advantages of the long OIC line of superior valves. This plastic valve lets you *see* how OIC Valves work—why they operate easier and quicker . . . why OIC Valves wear less and require less maintenance. This plastic Valve lets you see why OIC *Sets the Pace in Valves!*

CAREFULLY selected trim alloys for greater utility and durability. • Extra-deep stuffing box for a more efficient, longer lasting seal. • Long condensing chamber beneath stuffing box to protect the packing from excessive heat. • Precisely calculated flange dimensions, bolting requirements, and gaskets for a superior construction at these critical points. • End-seated type seat rings for a positive, leak-proof closure. • Straight-through ports to minimize turbulence and maintain peak pressure. • Sturdy I-beam wedge is guided by integrally-cast body ribs interlocked with long machined slots on each side of the wedge. This feature insures true alignment and reduces vibration during opening and closing.

6-149-25

SEND FOR THE OIC CROSS REFERENCE CHART

OIC VALVES

STEEL • IRON • BRONZE

No ulcers in this industrial "stomach"...

Lined with acid-proof brick bonded with Pennsalt PRF Cement, this sludge hopper digests and collects tank liquids corrosive waste liquors for neutralization and disposal at Allegheny Ludlum Steel Corp., Dunkirk, N. Y.

It takes a hardy system to "digest" waste pickle liquors like H_2SO_4, HCl, HF, HNO_3 together with caustic, alkalis and petroleum solvents all in one gulp!

Yet that's what this industrial waste tank at Allegheny Ludlum Steel Corp., Dunkirk, N. Y., has been doing for a year and a half. Maintenance? Nil. The Pennsalt PRF Cement joints are still in excellent condition, because PRF was especially designed to withstand the attacks of these chemicals.

Pennsalt PRF Cement is a resin-type cement, quick-setting, cold-hardening, easy to use. Thin joints (1/16" to 1/4") keep costs down. It bonds well with acid-proof brick, vitrified tile, carbon and Karbate brick, asphalt, wood, and—well, why not get the *full* story? Write for folder PRF 552—Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

Pennsalt PRF Cement helps protect waste pit for Allegheny Ludlum Steel Corporation

PENNSALT

Corrosion-Resistant Cements of many types for Acids, Alkalies, Solvents

Silicate Type
- Penchlor® Acid-Proof Cement
- Penchlor® Fire-Proof Cement

Acid and Alkali Resistant Paints
- Pennpaint #1—Primer and Clear Lacquer

Resin Type
- Aspli® Cement
- Compli® Cement
- Pennsalt PRF Cement
- Pennsalt PRK Cement
- Pennsalt NF Cement
- Pennsalt NVK Cement

®Reg. U. S. Pat. Off.

COLD FORMED

FROM A SINGLE TUBE

Nibcoloy WROT FITTINGS

OF STAINLESS STEEL AND NICKEL ALLOYS*

*Monel, Inconel, Nickel, Stainless Steel 304-347-316

No welds. No seams. The NIBCOLOY WROT tee is cold formed from a single tube, by an exclusive patented process. It forms a perfect joint, with a smooth interior that keeps down turbulence. All NIBCOLOY WROT Fittings—including elbows, tees, couplings, return bends—are precision formed by the same exclusive process.

Available from ¼" O. D. to 4" O. D. in Monel, Inconel, Nickel, and Stainless Steel 304-347-316, NIBCOLOY WROT Fittings make possible quality installations with economical light weight tubes—with the same metallurgical characteristics throughout.

Mail coupon or write now for catalog with detailed information without obligation to you.

NORTHERN INDIANA BRASS CO., 102 Plum St., Elkhart, Indiana

Without obligation send your catalog 902 on NIBCOLOY WROT Fittings.

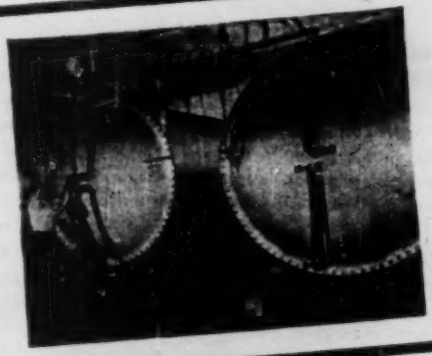
Name_____

Street_____

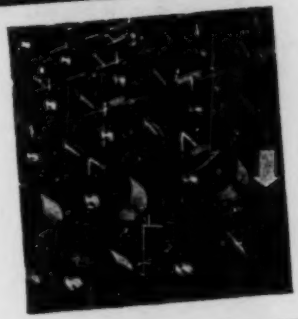
City_____ State_____

QUALITY VALVES AND FITTINGS SINCE 1904

SOLVING *Corrosion Problems* IN RAYON PLANTS

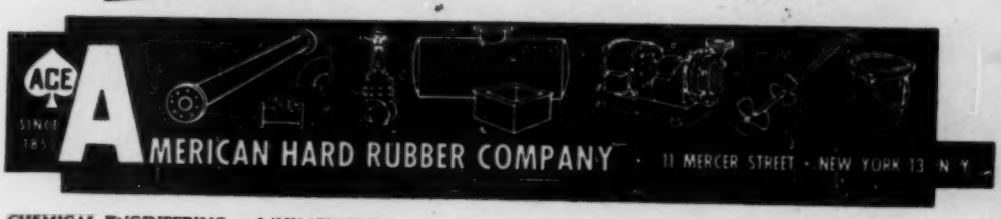


1. In storage and processing tanks, tough, impervious Ace hard rubber linings protect all exposed surfaces, offer years of protection against the acids used. They won't contaminate solutions. The same holds true for the Ace pumps, pipe, valves and fittings you see in rayon plants everywhere. Ask for Catalog 300-7.



2. In many spots where metals or other materials corrode too fast or are too costly, Ace molded hard rubber parts are the economical answer. Strong, unharmed by chemicals, they stand up indefinitely. These large Ace molded trays are a case in point. Ace engineers will be glad to help you design or redesign parts like these. Ask for new 56-page Hard Rubber Handbook.

3. Sometimes other Ace plastics are the answer—like this rayon spinnerette coupling molded of Ace Saran for long life, reasonable cost, and quick coupling action. Ace Parian pipe and fittings with unusual resistance to alkalies are another example. Inquire also about Ace Saran pipe and tubing for handling corrosive chemicals.

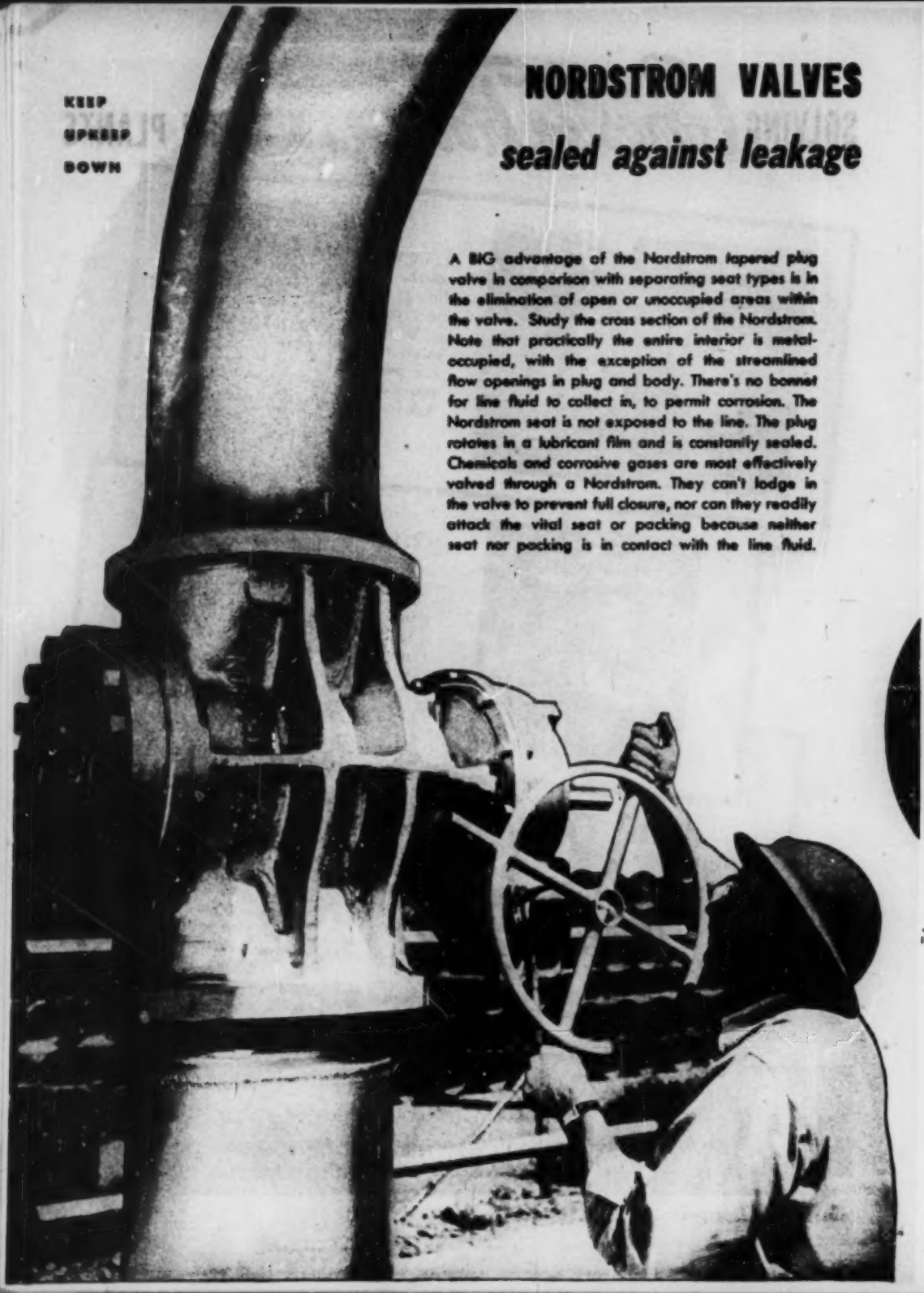


KEEP
UPKEEP
DOWN

NORDSTROM VALVES

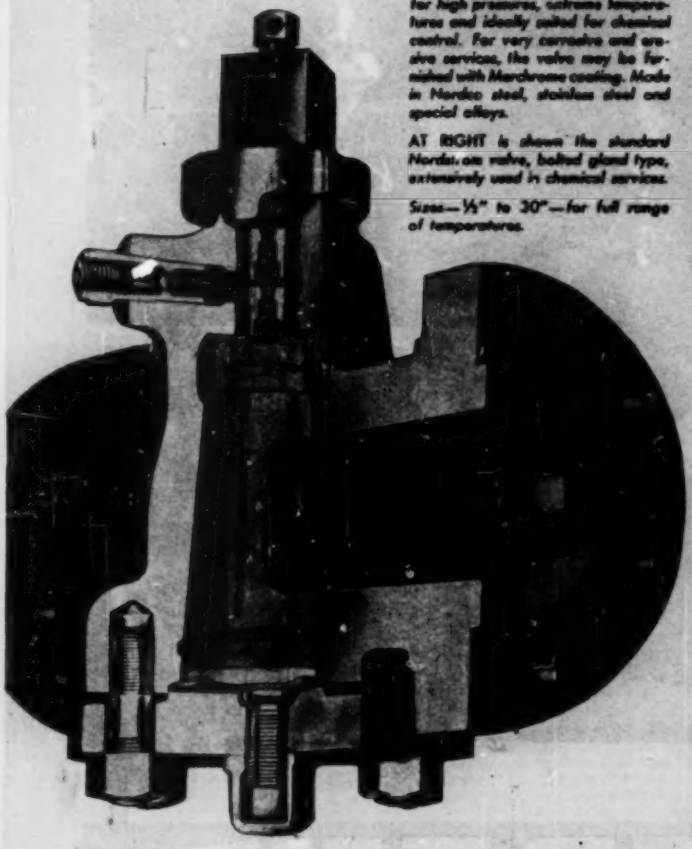
sealed against leakage

A BIG advantage of the Nordstrom *tapered* plug valve in comparison with separating seat types is in the elimination of open or unoccupied areas within the valve. Study the cross section of the Nordstrom. Note that practically the entire interior is metal-occupied, with the exception of the streamlined flow openings in plug and body. There's no bonnet for line fluid to collect in, to permit corrosion. The Nordstrom seat is not exposed to the line. The plug rotates in a lubricant film and is constantly sealed. Chemicals and corrosive gases are most effectively valved through a Nordstrom. They can't lodge in the valve to prevent full closure, nor can they readily attack the vital seat or packing because neither seat nor packing is in contact with the line fluid.



— BEST PROTECTED AGAINST CHEMICAL ATTACK

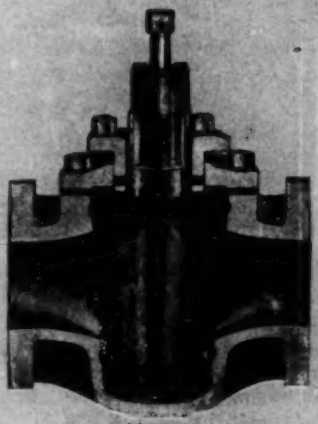
— *protected against corrosion and erosion*



AT LEFT is a cut-open view of the Nordstrom Hypressed valve, designed for high pressures, extreme temperatures and ideally suited for chemical control. For very corrosive and erosive services, the valve may be furnished with Marchrome coating. Made in Nordco steel, stainless steel and special alloys.

AT RIGHT is shown the standard Nordstrom valve, bolted gland type, extensively used in chemical services.

Sizes—½" to 30"—for full range of temperatures.



- ✓ METAL-OCCUPIED inner areas
- ✓ PLUG-SEATED on lubricant
- ✓ PORTS SEALED with plastic lubricant
- ✓ ROTARY MOVEMENT makes positive closure
- ✓ FLUSH PASSAGE-WAY prevents sediment lodging
- ✓ TAPERED PLUG avoids sticking
- ✓ UNEXPOSED SEAT prevents corrosion

Nordstrom

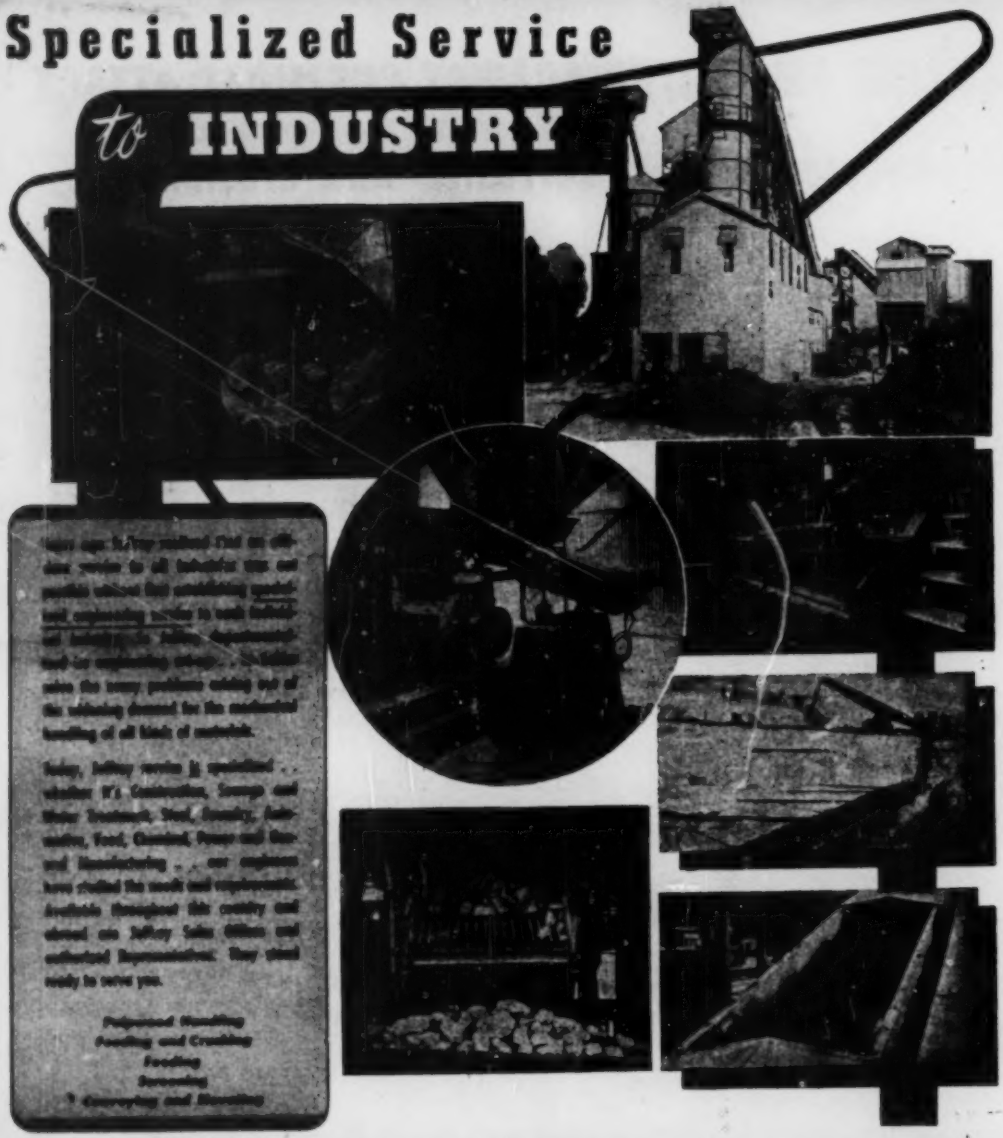
LUBRICATED VALVES

NORDSTROM VALVE DIVISION — Rockwell Manufacturing Company

Main Office: 400 North Lexington Avenue, Pittsburgh 8, Pa., Atlanta, Boston, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa

Export: Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

Specialized Service to INDUSTRY



Complete Line of Material Handling, Processing and Mining Equipment

JEFFREY

ESTABLISHED 1877

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared Monthly by U. S. Industrial Chemicals, Inc.*

U.S.I. CHEMICAL NEWS

January ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

Diethyl and Dibutyl Phthalate Continue To Find Wide Use

Diethyl and dibutyl phthalate continue to be among the most popular plasticizers for nitrocellulose and certain plastics. Besides having the physical and chemical properties important in plasticizers, these two phthalic acid esters also possess the important advantage of low cost. In addition to its widespread use in plasticizing nitrocellulose lacquers, dibutyl phthalate is a plasticizer for ethyl cellulose, chlorinated rubber, and other resinous materials. Diethyl phthalate is an important plasticizer for cellulose acetate plastics. Both phthalates are employed in extreme pressure lubricants to prevent moving parts from "seizing." U.S.I.'s long experience in the production of these chemicals, and close chemical control of their manufacture, assures customers of a source for high quality products. Moreover, U.S.I.'s excellent distribution service is further increased by making diethyl and dibutyl phthalate also available in compartment tank cars and mixed carloads, with industrial alcohols and solvents.

From Kangaroo To Leather, a Short Hop

Fibers from the tail tendon of the kangaroo are providing a quicker, easier way of testing new synthetic tannins for leather, a research scientist revealed recently. It is much easier, the report states, to split apart the relatively parallel fibers of a kangaroo's tail tendon than it is to pull apart the complex three-dimensional weaves found in the ordinary skin or leather. The scientist states that thousands of fibers, some of them even finer than a human hair, can be obtained from one tail tendon. The kangaroo fibers, it is reported, give the same reaction with chemicals as does leather.

German Alkylamine Data Now Available in Report

A report on German commercial processes for the production of alkylamines has been made available. The two processes discussed are amination of alcohols over alumina catalysts, and hydroamination of aldehydes, ketones or carboxylic acids. Also listed in the report are methods said to be most feasible for production of individual amines—with notes on their peculiarities. A separate section dealing with catalysts for manufacture has been included.

'Molecular Crystal Gazer'

A unique electronic instrument has been developed, it is reported, for probing the atomic structure of crystalline substances weighing as little as 1/28 millionth of an ounce. The instrument is expected to find use in investigating catalysts, lubricants, paints, inks, and dyes, and in studying corrosion. Identification of an unknown substance will be possible, it is claimed, by comparing its structure to known patterns on file.

Demand for Low-Pressure Aerosols Seen Up in 1949

U.S.I. 'Pyrenones' Are Effective, Safe, Economical Insecticide Ingredients for Aerosol Formulations

Properly formulated and correctly packaged low-pressure aerosols combine the convenience, effectiveness, and economy which are irresistible appeals to the American buying public. In 1948, unanticipated production difficulties and delays held up the appearance of low-pressure aerosols on the market, and relatively little sales promotion to the general public was undertaken. This year, however, with the experience gained in 1948—and with consumer acceptance being widened by increased publicity and advertising—low-pressure aerosols offer great possibilities to the insecticide industry.

Most the Megarhyssa flies and other common insects are no longer a problem to housewives who use low-pressure aerosols based on safe, effective, U.S.I. "Pyrenones."

Pyrenones Meet Low-Pressure Aerosol Requirements

Aware of the fact that the future of low-pressure aerosols depends on getting and keeping consumer acceptance, insecticide manufacturers have been directing their attention to a number of important performance requirements.

The question of effectiveness of the insecticide itself is,

MORE

New 'Electric Sandwich' Finds Paint Film Flaws

Electrically charged "sandwiches" are being used now to assist in developing completely waterproof paints, a recent report by university scientists discloses. The new method has been designed to reveal tiny, pin-point film flaws, through which water could enter.

Paper soaked in salt solution is sandwiched between a painted iron plate and an aluminum plate, according to the report, and the metal plates are connected to opposite poles of a battery. If the paint film on the iron is not impervious to water, the salt solution will seep through, and specks of iron will be deposited on the wet paper, the report continues.

When the paper is removed and treated with a mixture of potassium ferrocyanide and potassium ferricyanide—in a process similar to that used in the making of blueprints—a permanent map showing size, shape, and location of flaws is obtained, the scientists claimed. The new method is said to be valuable for evaluating and comparing paint modifications and treatments.

Plastic Is Substitute For Bone in Surgery

Polyethylene has been found to be a very satisfactory substitute for human cartilage and bone in plastic surgery, a group of New York physicians announced recently. The plastic has been used successfully, the report states, in the reconstruction of noses, ears, jaws, and even portions of the human skull. Experiments on animals are said to be in progress now using the plastic—in the form of molded tubes—to replace damaged arterial parts and to reconstruct the common bile duct.

The plastic has certain advantages, the report continues, over cartilage and bone, and it is described as forming a secure framework on which surgeons can build in repairing physical deformities. Only chemically pure polyethylene, the physicians point out, must be used, since most commercial compounds were found to be harmful to body tissues.

Corrosion-Resistant Pump

A new corrosion-resistant pump for transferring acids and other liquids from carboys, barrels, or drums, is said to make tilting of the container unnecessary and to allow liquids to flow smoothly and stop instantly.

Radioactivity and Tracer Handbook Is Now Ready

A handbook of radioactivity and tracer methodology, said to be probably the most comprehensive work yet to appear on this subject, is now available to the public. The average radioisotope user will find the handbook an excellent reference, it is reported, because it is concerned not only with tracer techniques, but also with some of the fundamental concepts of nuclear physics, isotope production and instrumentation. The report is said to contain an unusually complete bibliography. The three main divisions of the handbook are: Nuclei and Radioactivity; Measurement of Isotopes; Biological and Medical Applications of Isotopes. The handbook, almost 900 pages long, is expected to be a standard laboratory reference where isotopes are used.

KEEP

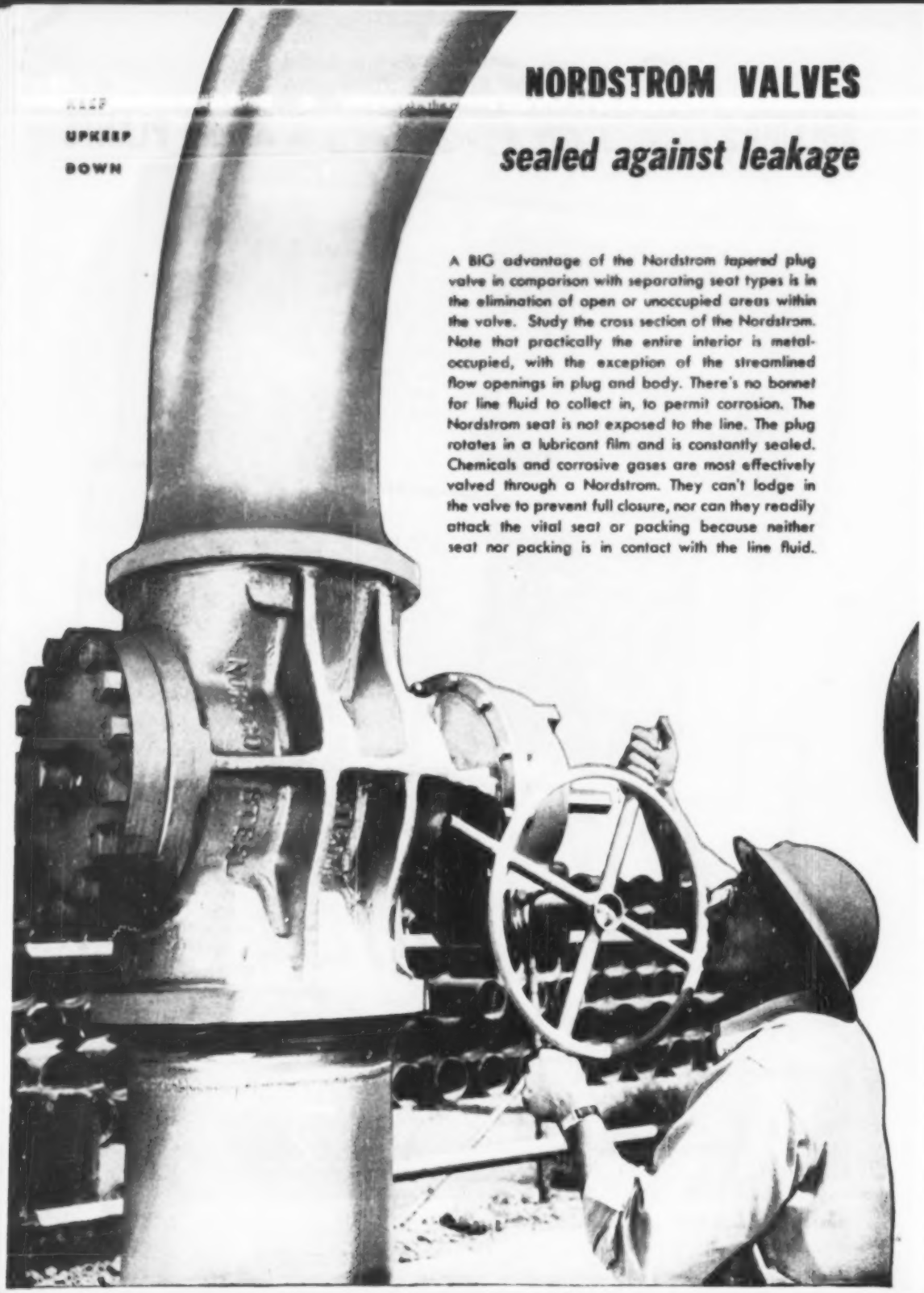
UPKEEP

DOWN

NORDSTROM VALVES

sealed against leakage

A BIG advantage of the Nordstrom *tapered* plug valve in comparison with separating seat types is in the elimination of open or unoccupied areas within the valve. Study the cross section of the Nordstrom. Note that practically the entire interior is metal-occupied, with the exception of the streamlined flow openings in plug and body. There's no bonnet for line fluid to collect in, to permit corrosion. The Nordstrom seat is not exposed to the line. The plug rotates in a lubricant film and is constantly sealed. Chemicals and corrosive gases are most effectively valved through a Nordstrom. They can't lodge in the valve to prevent full closure, nor can they readily attack the vital seat or packing because neither seat nor packing is in contact with the line fluid.



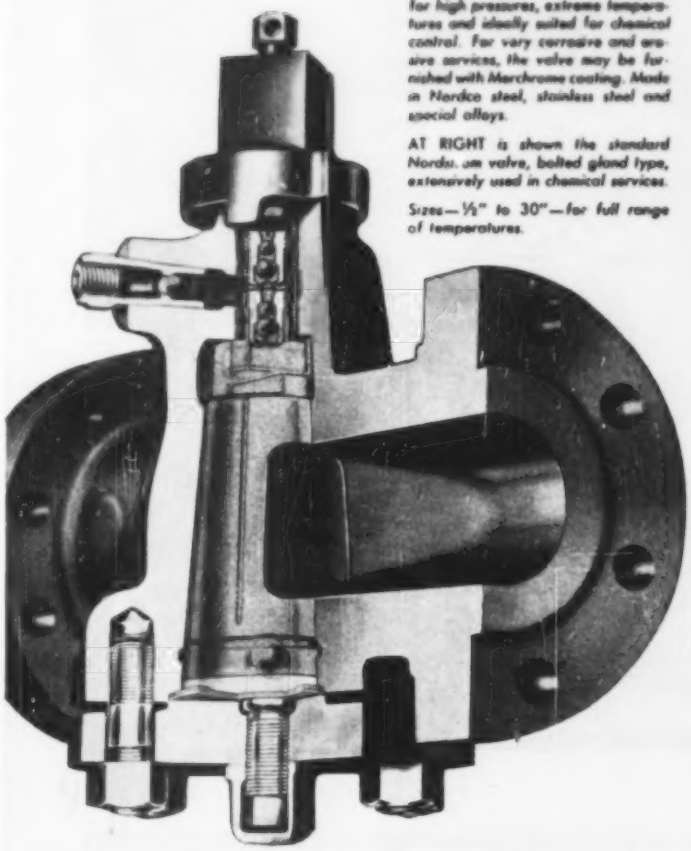
— BEST PROTECTED AGAINST CHEMICAL ATTACK

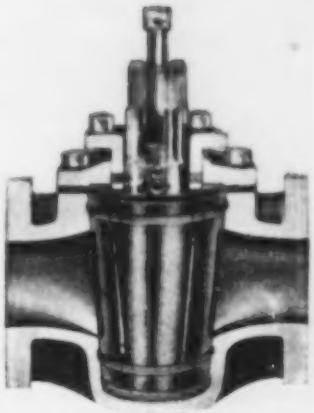
— *protected against corrosion and erosion*

AT LEFT is a cut-open view of the Nordstrom Hypressal valve, designed for high pressures, extreme temperatures and ideally suited for chemical control. For very corrosive and erosive services, the valve may be furnished with Marchrome coating. Made in Nordco steel, stainless steel and special alloys.

AT RIGHT is shown the standard Nordstrom valve, bolted gland type, extensively used in chemical services.

Sizes—½" to 30"—for full range of temperatures.





- ✓ **METAL-OCCUPIED** *inner areas*
- ✓ **PLUG-SEATED** *on lubricant*
- ✓ **PORTS SEALED** *with plastic lubricant*
- ✓ **ROTARY MOVEMENT** *makes positive closure*
- ✓ **FLUSH PASSAGE-WAY** *prevents sediment lodging*
- ✓ **TAPERED PLUG** *avoids sticking*
- ✓ **UNEXPOSED SEAT** *prevents corrosion*

Nordstrom

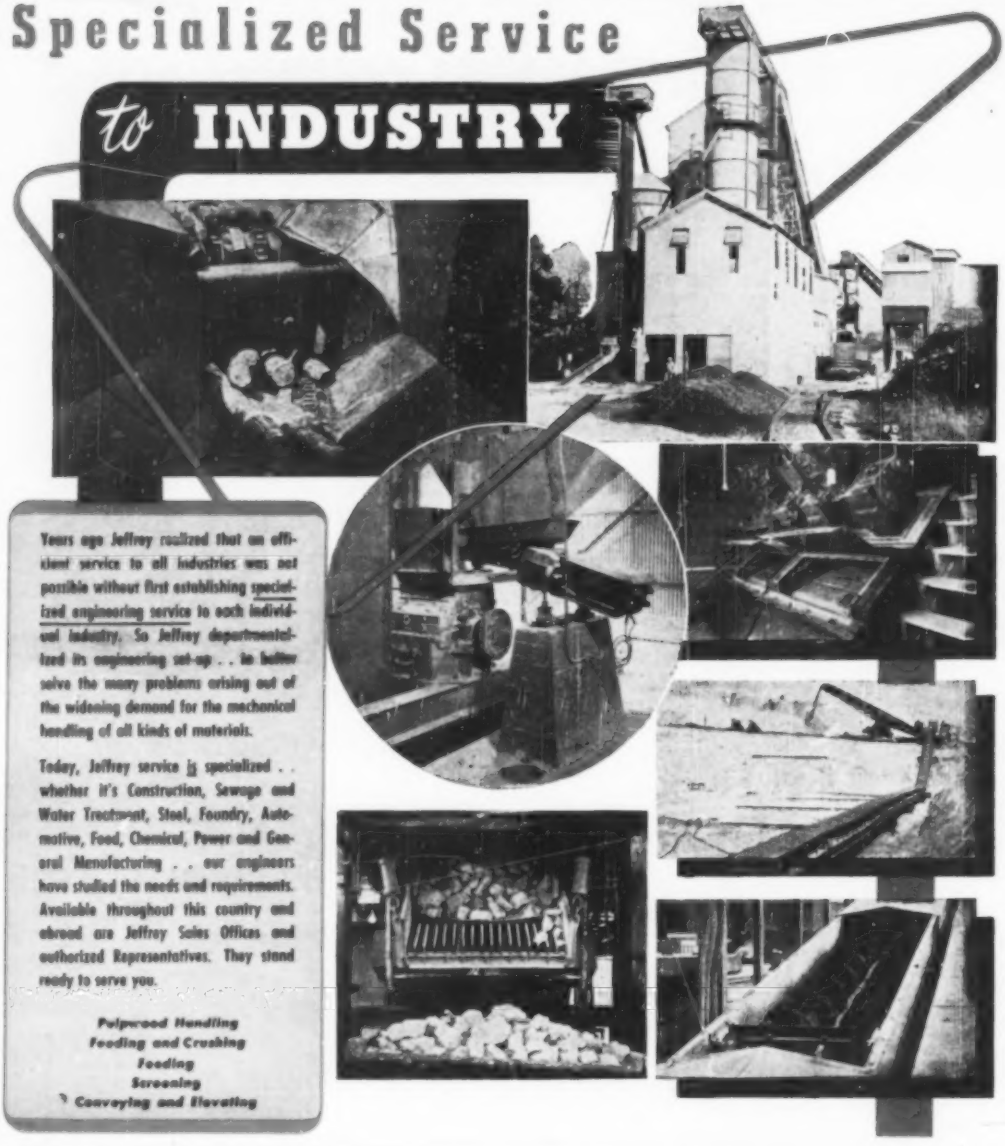
LUBRICATED VALVES

NORDSTROM VALVE DIVISION — ***Rockwell Manufacturing Company***

Main Office, 400 North Lexington Avenue, Pittsburgh 8, Pa., Atlanta, Boston, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa

Export: Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

Specialized Service *to* INDUSTRY



Years ago Jeffrey realized that an efficient service to all industries was not possible without first establishing specialized engineering service to each individual industry. So Jeffrey departmentalized its engineering set-up . . to better solve the many problems arising out of the widening demand for the mechanical handling of all kinds of materials.

Today, Jeffrey service is specialized . . whether it's Construction, Sewage and Water Treatment, Steel, Foundry, Automotive, Food, Chemical, Power and General Manufacturing . . our engineers have studied the needs and requirements. Available throughout this country and abroad are Jeffrey Sales Offices and authorized Representatives. They stand ready to serve you.

Pulpwood Handling
Feeding and Crushing
Feeding
Screening
Conveying and Elevating

THE JEFFREY MANUFACTURING COMPANY
909 North Fourth St., Columbus 16, Ohio
ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared Monthly by U. S. Industrial Chemicals, Inc.*

U.S.I. CHEMICAL NEWS

January ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

Diethyl and Dibutyl Phthalate Continue To Find Wide Use

Diethyl and dibutyl phthalate continue to be among the most popular plasticizers for nitrocellulose and certain plastics. Besides having the physical and chemical properties important in plasticizers, these two phthalic acid esters also possess the important advantage of low cost. In addition to its wide-spread use in plasticizing nitrocellulose lacquers, dibutyl phthalate is a plasticizer for ethyl cellulose, chlorinated rubber, and other resinous materials. Diethyl phthalate is an important plasticizer for cellulose acetate plastics. Both phthalates are employed in extreme pressure lubricants to prevent moving parts from "seizing." U.S.I.'s long experience in the production of these chemicals, and close chemical control of their manufacture, assures customers of a source for high quality products. Moreover, U.S.I.'s excellent distribution service is further increased by making diethyl and dibutyl phthalate also available in compartment tank cars and mixed carloads, with industrial alcohols and solvents.

From Kangaroo To Leather, a Short Hop

Fibers from the tail tendon of the kangaroo are providing a quicker, easier way of testing new synthetic tannins for leather, a research scientist revealed recently. It is much easier, the report states, to split apart the relatively parallel fibers of a kangaroo's tail tendon than it is to pull apart the complex three-dimensional weaves found in the ordinary skin or leather. The scientist states that thousands of fibers, some of them even finer than a human hair, can be obtained from one tail tendon. The kangaroo fibers, it is reported, give the same reaction with chemicals as does leather.

German Alkylamine Data Now Available in Report

A report on German commercial processes for the production of alkylamines has been made available. The two processes discussed are amination of alcohols over alumina catalysts, and hydroamination of aldehydes, ketones or carboxylic acids. Also listed in the report are methods said to be most feasible for production of individual amines – with notes on their peculiarities. A separate section dealing with catalysts for manufacture has been included.

'Molecular Crystal Gazer'

A unique electronic instrument has been developed, it is reported, for probing the atomic structure of crystalline substances weighing as little as 1/28 millionth of an ounce. The instrument is expected to find use in investigating catalysts, lubricants, paints, inks, and dyes, and in studying corrosion. Identification of an unknown substance will be possible, it is claimed, by comparing its structure to known patterns on file.

Demand for Low-Pressure Aerosols Seen Up in 1949

U.S.I. 'Pyrenones' Are Effective, Safe, Economical Insecticide Ingredients for Aerosol Formulations

Properly formulated and correctly packaged low-pressure aerosols combine the convenience, effectiveness, and economy which are irresistible appeals to the American buying public. In 1948, unanticipated production difficulties and delays held up the appearance of low-pressure aerosols on the market, and relatively little sales promotion to the general public was undertaken. This year, however, with the experience gained in 1948 – and with consumer acceptance being widened by increased publicity and advertising – low-pressure aerosols offer great possibilities to the insecticide industry.

Meet the Megarhyssa! Flies and other common insects are no longer a problem to housewives who use low-pressure aerosols based on safe, effective, U.S.I. "Pyrenones."

Pyrenones Meet Low-Pressure Aerosol Requirements

Aware of the fact that the future of low-pressure aerosols depends on getting and keeping consumer acceptance, insecticide manufacturers have been directing their attention to a number of important performance requirements.

The question of effectiveness of the insecticide itself is,

MORE

New 'Electric Sandwich' Finds Paint Film Flaws

Electrically charged "sandwiches" are being used now to assist in developing completely waterproof paints, a recent report by university scientists discloses. The new method has been designed to reveal tiny, pin-point film flaws, through which water could enter.

Paper soaked in salt solution is sandwiched between a painted iron plate and an aluminum plate, according to the report, and the metal plates are connected to opposite poles of a battery. If the paint film on the iron is not impervious to water, the salt solution will seep through, and specks of iron will be deposited on the wet paper, the report continues.

When the paper is removed and treated with a mixture of potassium ferrocyanide and potassium ferricyanide – in a process similar to that used in the making of blueprints – a permanent map showing size, shape, and location of flaws is obtained, the scientists claimed. The new method is said to be valuable for evaluating and comparing paint modifications and treatments.

Plastic Is Substitute For Bone in Surgery

Polyethylene has been found to be a very satisfactory substitute for human cartilage and bone in plastic surgery, a group of New York physicians announced recently. The plastic has been used successfully, the report states, in the reconstruction of noses, ears, jaws, and even portions of the human skull. Experiments on animals are said to be in progress now using the plastic – in the form of molded tubes – to replace damaged arterial parts and to reconstruct the common bile duct.

The plastic has certain advantages, the report continues, over cartilage and bone, and it is described as forming a secure framework on which surgeons can build in repairing physical deformities. Only chemically pure polyethylene, the physicians point out, must be used, since most commercial compounds were found to be harmful to body tissues.

Corrosion-Resistant Pump

A new corrosion-resistant pump for transferring acids and other liquids from carboys, barrels, or drums, is said to make tilting of the container unnecessary and to allow liquids to flow smoothly and stop instantly.

Radioactivity and Tracer Handbook Is Now Ready

A handbook of radioactivity and tracer methodology, said to be probably the most comprehensive work yet to appear on this subject, is now available to the public. The average radioisotope user will find the handbook an excellent reference, it is reported, because it is concerned not only with tracer techniques, but also with some of the fundamental concepts of nuclear physics, isotope production and instrumentation. The report is said to contain an unusually complete bibliography. The three main divisions of the handbook are: Nuclei and Radioactivity; Measurement of Isotopes; Biological and Medical Applications of Isotopes. The handbook, almost 900 pages long, is expected to be a standard laboratory reference where isotopes are used.

ADVERTISEMENT—*This entire page is a paid advertisement* *Printed in U. S. A.*

January ★ **U.S.I. CHEMICAL NEWS** ★ 1949

New Process Separates Butanes and Butenes

A new process has been developed for separating a mixture containing butenes, butanes, and high boiling hydrocarbons, according to a recent patent. The method involves distilling the hydrocarbon mixture in the presence of acetone. From the distillation, a fraction rich in butanes is recovered. A major proportion of the acetone rich in butenes and high boiling hydrocarbons is obtained as a bottoms product, which is then distilled. A portion of the acetone and high boiling hydrocarbons recovered from this distillation is added to the distillate fraction—which is then washed with water to recover acetone free of high boiling hydrocarbons.

CONTINUED

Low-Pressure Aerosols

of course, of great importance. Here the industry has both satisfactory materials and the necessary knowledge of how to formulate them. Over ninety percent of all low-pressure aerosols now contain U.S.I. "Pyrenones." Pyrenones are highly insecticidal, free from objectionable odor and toxic hazards, economical—and also non-inflammable and otherwise safe for normal handling, storage, and use. These chemically and entomologically standardized oil concentrates of technical piperonyl butoxide and purified extracts of pyrethrum—available in nearly all conceivable ratios for imparting various performance characteristics to the aerosol—enable insecticide manufacturers to turn out highly effective low-pressure aerosols at reasonable cost.

Consumer acceptance may be fairly well guaranteed for aerosols meeting the requirements of satisfactory packaging, insecticidal effectiveness, and freedom from toxicity and objectionable odors and irritations. But if low-pressure aerosols are to be as widely adopted and used as is entirely possible, a great deal of effective and intelligent publicity and advertising will be required.

FIGHT INFANTILE PARALYSIS

Free Leaflet Describes New Alcohol Container

To describe its new convenient container for U.S.I. Ethyl Alcohol U.S.P., U. S. Industrial Chemicals, Inc., has issued a four-page leaflet of particular interest to users of small packages of pure ethyl alcohol. The folder points out that the new glass bottle contains 1.21 wine gallons or 2.3 proof-gallons of U.S.I. Ethyl Alcohol, 190 proof (95%), fully conforming with the exacting specifications of the U.S.P. XIII for pure ethyl alcohol. The specially designed outer package, according to the folder, is made tamper-proof for the user's protection. Free copies of the leaflet may be obtained by writing the Editor of U.S.I. Chemical News.

Ethyl Acetoacetate Gains in Importance As Intermediate

Ethyl acetoacetate continues to find extensive use as an intermediate in the manufacture of dyes of the pyrazolone and Hansa Yellow groups and other yellow pigment dyestuffs. It is also important in the production of a number of pharmaceuticals, antimalarials, and vitamin B_1. Because of its chemical structure, ethyl acetoacetate enters into a wide variety of reactions, making it an important compound in many chemical syntheses. U. S. Industrial Chemicals, Inc.—pioneer commercial producer of ethyl acetoacetate—reports that the present ready availability of this intermediate will extend the possibilities for commercial use of this already important chemical.

Ultra-Sound Tests Paints

Adhesion properties of synthetic paints and varnishes can now be tested, it is said, in less than a second with a new instrument that uses the force of ultra-sound. The coating is smeared on a cylinder which is subjected to violent vibration. The vibrational force needed to shake the coating loose is a measure of how long the coating may be expected to wear under normal conditions.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

A vapor phase rust inhibitor made available in the form of treated paper, is said to produce around a wrapped metal part a nonreactive atmosphere, reported to persist for as long as several years in a confined space. **(No. 404)**

A new automatic spray painter for steel drum chimes, said to paint more than 400 drums per hour, reduces offspray and saves paint, the makers claim. **(No. 405)**

Swift, dustless, uniform blending of powder is achieved, it is claimed, with a new machine said to be useful for laboratory use by manufacturers of paints, inks, plastics, food products, etc. **(No. 406)**

A new plastic covering material for woodwork and wood products is said to be unique in that the finish, including color and pattern, is applied to the back surface of transparent sheeting, away from direct wear or solvent action. **(No. 407)**

An adhesive that bonds polystyrene to itself and to paper, cardboard, fabric, glass, rubber, and certain other plastics, is easily applied in both wet and dry assembly, the makers state. **(No. 408)**

For measuring one part per billion concentrations of riboflavin, thiamin, and various metal complexes, oils, pharmaceuticals, and other fluorescent substances, a photoelectric fluorometer is said to be available. **(No. 409)**

Two new antioxidants are reported to protect edible fats and oils against rancidity for the usual time required for processing, distribution, and consumption. **(No. 410)**

To clean and dry laboratory glassware without wiping, a new surface active agent is on the market. Described as non-ionic and stable in the presence of acids and bases, the agent is said to be non-toxic. **(No. 411)**

For controlling fires involving alcohol, acetone, ether, and other polar solvents, a new charge for foam type extinguishers has been developed. It is said to snuff out flames in a matter of seconds and to prevent flashbacks. **(No. 412)**

A new non-flammable varnish remover is said to be useful for removing varnish, lacquer, paint, or enamel from any type surface. **(No. 413)**

U.S.I INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., NEW YORK 17, N. Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

ALCOHOLS
Amyl Alcohol
Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined

Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%
—Absolute
*Super Pyro Anti-freeze
*Solox proprietary Solvent

***ANSOLS**
Ansol M
Ansol PR

*Registered Trade Mark

ACETIC ESTERS
Amyl Acetate
Butyl Acetate
Ethyl Acetate

OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS
*Diatol
Diethyl Carbonate
Ethyl Chloroformate

INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodiumoxalacetate

ETHERS
Ethyl Ether
Ethyl Ether Absolute—A.C.S.

FEED CONCENTRATES
Riboflavin Concentrates *Vacotone 40
*Curbay B-G *Special Liquid Curbay

ACETONE
Chemically Pure

RESINS (Synthetic and Natural)
*Aroplaz—alkyds and allied materials
*Arofene—pure phenolics
*Arochem—modified types
Ester Gums—all types
Congo Gums—raw, fused & esterified
Natural Resins—all standard grades

INSECTICIDE MATERIALS
*Pyrenone Concentrates
Pyrethrum Products
Rotenone Products

INSECTIFUGE MATERIALS
*Indalone
*Dimelone
Triple-Mix Repellents

OTHER PRODUCTS
Collodions Urethan, U.S.P.
Nitrocellulose Solutions dl-Methionine
Ethylene

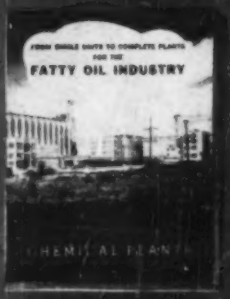
Printed in U.S.A.

INFORMATION ON MODERN CHEMICAL AND PROCESS EQUIPMENT

1

2

3



4

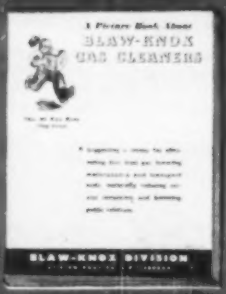
5

6

7

8

9



10

11

12

BLAW-KNOX

Advertising Dept., Blaw-Knox Co.
P. O. Box 1198, Pittsburgh 30, Pa.

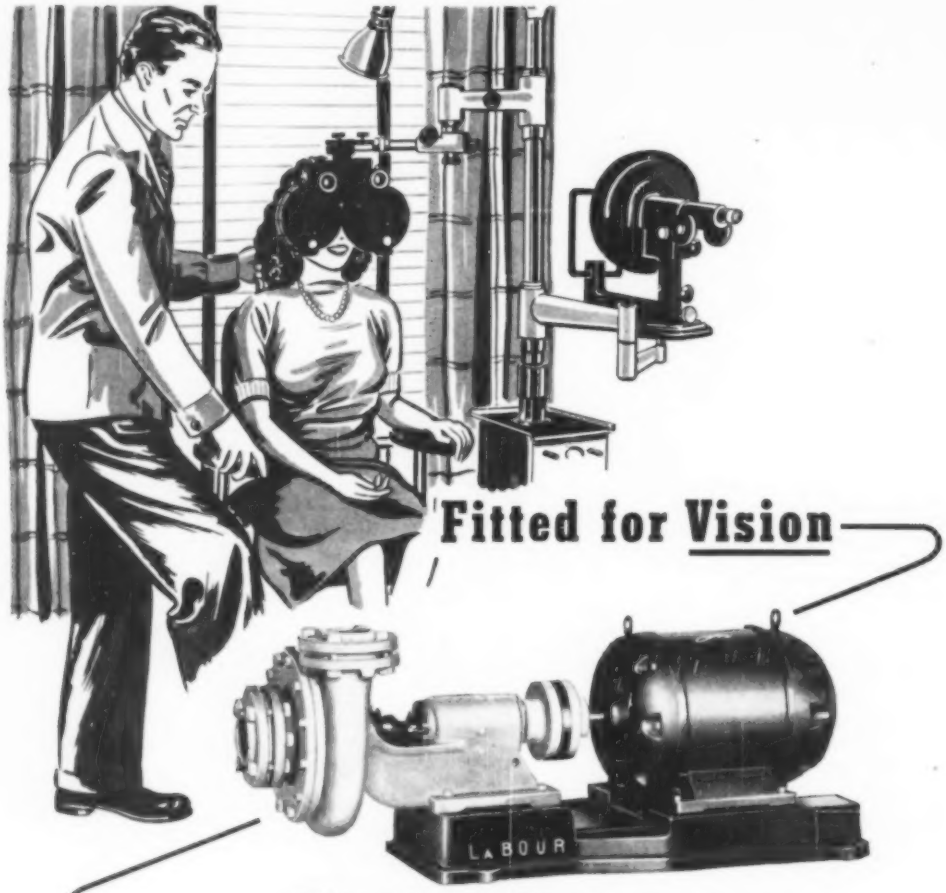
I am especially interested in item(s) of Blaw-Knox literature corresponding to the number(s) I have checked on this coupon. 1 2 3 4 5 6 7 8 9 10 11 12

HAVE REPRESENTATIVE CALL ☐

Name_____ Title_____

Firm_____

Address_____

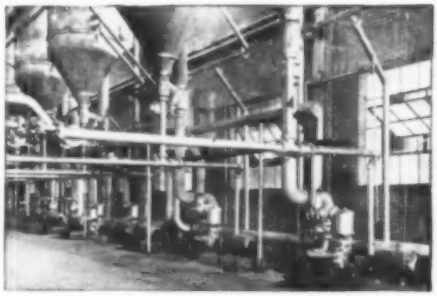


For maximum performance and operating economy, it pays to fit your centrifugal pumps to their jobs as carefully as an optometrist fits glasses. This is especially true of pumps for vacuum service.

"Playing safe" with an oversize pump is a costly proposition—costly not only in the price of the larger pump, but also in continuing excess power charges, with needless noise and foaming besides.

When you specify a LaBour, it is unnecessary to include a "safety factor." Just tell us your actual requirements as to capacity and head. The inherent characteristics of the LaBour will take care of unusual overloads when they occur, yet you pay no penalty in ordinary operation. Only LaBour's exclusive design makes this possible.

If you want factual evidence—just ask us.



LaBour pumps on the largest black liquor evaporator ever built. This evaporator was built by Swenson Evaporator Division of Whiting Corporation.

LaBOUR CENTRIFUGAL PUMPS

THE LABOUR COMPANY, Inc. • Elkhart, Indiana, U.S.A.

0 TO 10 PSI
30 TO 10,000 PSI
0 TO 30 PSI (ABSOLUTE)
Here's where to start
14 TO 4,000 PSI
10 TO 12 PSI
5 TO 30 PSI
FURNACE PRESSURE DRAFT

FOR PRECISE PRESSURE CONTROL

These measuring elements are the heart of Brown pressure control systems for the Chemical Industry . . . because precision control starts with precise measurement!

Complete coverage of pressure problems necessitates this complete line of elements. There's a specific one for each application . . . from microns to tons . . . from corrosive to non-corrosive! They make Brown Pressure Gauges *the finest available to the Chemical Industry!*

You'll find detailed information in Catalog 7000 . . . send for it today!

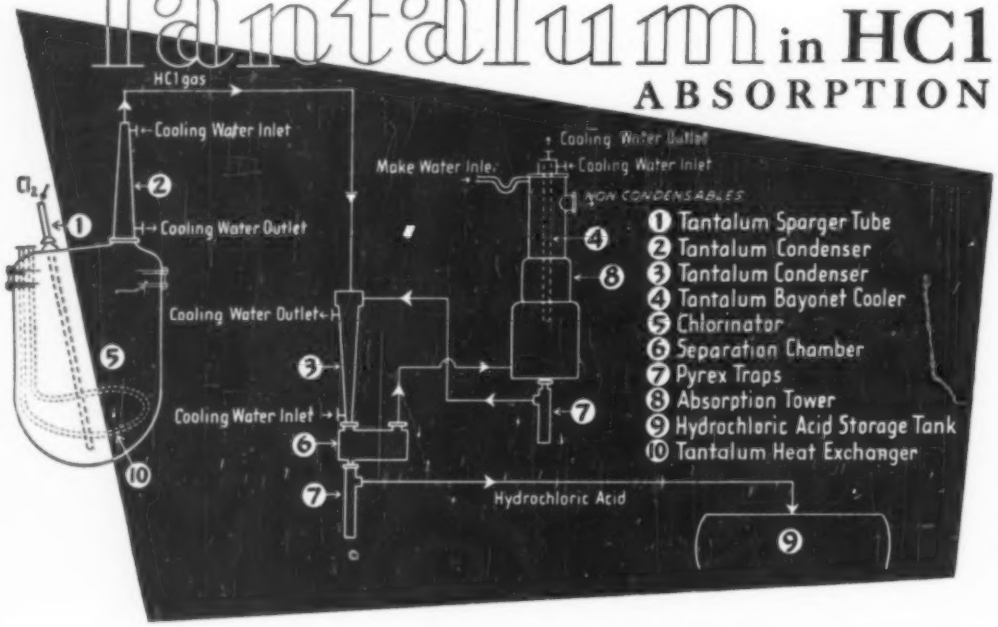
MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4478 Wayne Ave., Philadelphia 44, Pa.
Offices in principal cities of the United States, Canada and throughout the world

BROWN *Advanced Instrumentation* FOR THE CHEMICAL INDUSTRY
Product of Honeywell

Cost Saving

with the exclusive advantages of

Tantalum in HCl ABSORPTION

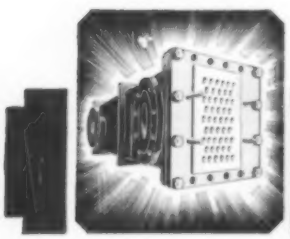


The flow diagram shows a typical use of Fansteel-built Tantalum Absorption plants in converting by-product hydrogen chloride gas from a chlorinating operation into marketable hydrochloric acid. The diagram also shows a tantalum sparger tube for introducing chlorine into the reaction kettle and a tantalum reflux condenser to recover the chlorinated product.

The overall economy of tantalum HCl absorbers is (1) complete freedom from corrosion, (2) freedom from thermal shock, (3) low consumption of cooling water, (4) no contamination of product acid, (5) precise control and immediate response to adjustment, (6) conservation of space, (7) simple installation and operation, (8) low maintenance.

Fansteel Absorption Plants, each built for its particular service, are performing splendidly all over the world. We will welcome a consultation on your requirements—for better service at lower cost. Fansteel Metallurgical Corporation, North Chicago, Illinois.

USE TANTALUM WITH ECONOMY. For most acid solutions and corrosive gases or vapors, except HF, alkalis, or substances containing free SO_3.



Fansteel

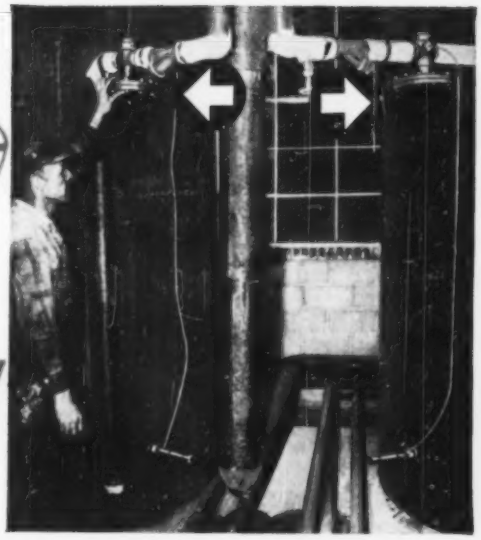
Acid-Proof

TANTALUM

CHEMICAL PLANT EQUIPMENT

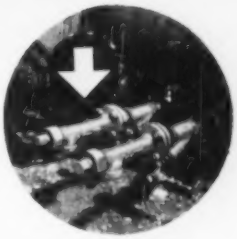
OIL WAX and MOLASSES

on the Run with SARCO



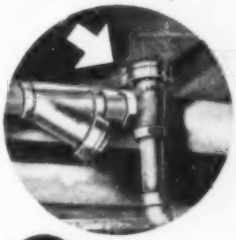
Sarco 2430 Control on wax storage tanks

Why set up an expensive plant and allow slow-downs because the liquid materials won't run fast enough? From initial storage of raw materials to final processing and packaging, there is a Sarco Hook-Up for steam traps and temperature controls that will make everything run smoothly with minimum fuel and pumping costs.



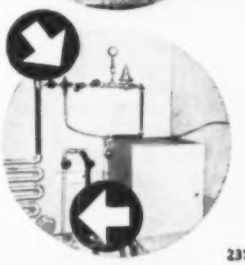
Sarco Thermoton Trap-Control on bulk oil storage tanks

Out-door tanks are trapped and controlled by the inexpensive Sarco 87-C Thermoton which cannot freeze. For close control and indoor tanks, several types of Sarco Traps and Controls are available. Removal of air from lines can be accomplished in many ways.



Sarco No. 9 on creosoting retorts

It's a case where all Sarco products work together as a team to make your plant automatic, and use less fuel. The Sarco Representative near you can show how it is being done in plants similar to yours.



Sarco KR-14 controls temperatures of molasses in receiving room

237

SARCO
SAVES STEAM

SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 5, ONTARIO

NOW...it's a long time between inspections!

Worthington 32 x 16 Twin Tandem Horizontal Duplex Dry Vacuum Pump at Buffalo Electrochemical Co., Inc.

Worthington triples the running time of previous installation

After searching investigation, this Worthington Dry Vacuum Pump was selected to replace highly recommended imported pumps which alone were thought capable of handling highly oxidizing and corrosive gases.

One deciding factor was the famous Worthington Feather* Valve — the lightest, tightest, quietest ever made. After an initial 10-week run, it was found that this and the many other advanced Worthington features had turned in a performance exceeding that of the imported pumps. Since then, the Worthington Pump has operated on regular 10-week periods between inspections and cleaning — *as compared with previous 3-week periods!*

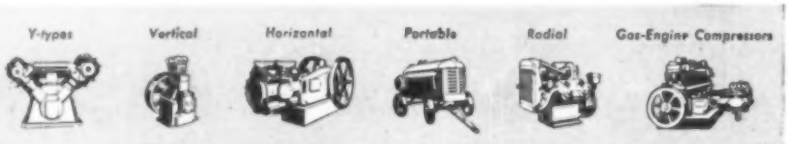
GET THE DETAILS

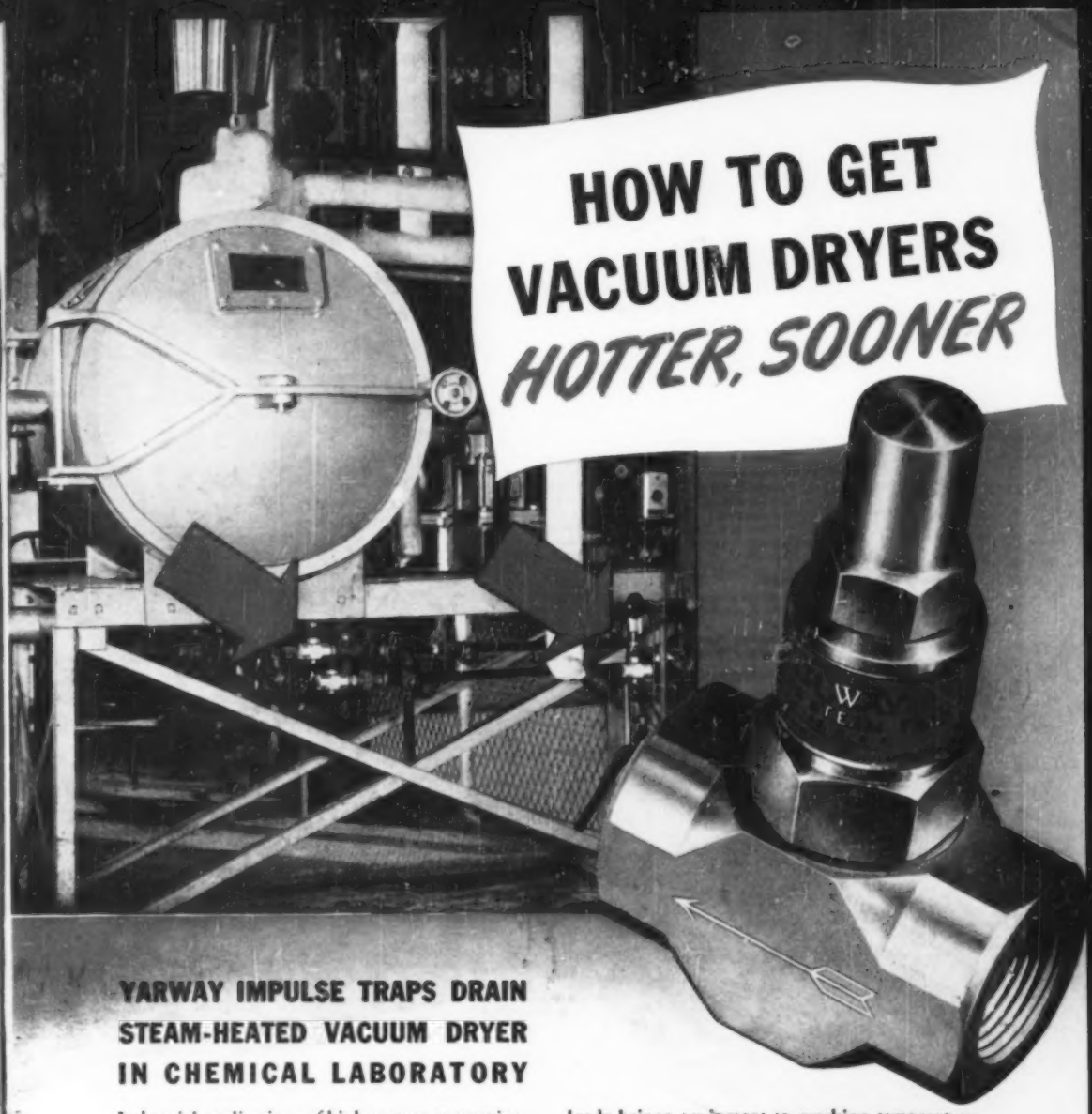
All through industry, Worthington Horizontal Dry Vacuum Pumps are leaving records of better-than-expected performance . . . piling up proof that *there's more worth in Worthington.* Bulletin L-710-B1B gives you the reasons why. Write to *Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, N. Y.* *Reg. U. S. Pat. Off.

WORTHINGTON

K0-6

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON





HOW TO GET VACUUM DRYERS *HOTTER, SOONER*

YARWAY IMPULSE TRAPS DRAIN STEAM-HEATED VACUUM DRYER IN CHEMICAL LABORATORY

Industrial applications of high vacuum processing are constantly increasing . . . and so are installations of Yarway Impulse Steam Traps.

Here at the Eastern Regional Research Laboratory of the Department of Agriculture, three Yarways are shown on a steam-heated vacuum drum dryer in the Chemical Engineering and Development Division.

These and nearly 200 other Yarways used on various equipment in the laboratory, are doing a good job . . . and so they should. Yarways are famous for *getting equipment hotter, sooner, and keeping it hot. Continuous* discharge under heavy loads brings equipment to working temperature *sooner;* discharge at *short intervals* under lighter condensate loads *keeps it hot.*

Other Yarway features—one moving part, easy maintenance, small size, easy to install, suitable for all pressures, low price.

Try a Yarway today . . . standardize on Yarways tomorrow. See your local Mill Supply Dealer or write for Yarway Bulletin T-1739.

YARNALL-WARING COMPANY
137 Mermaid Ave., Philadelphia 18, Pa.

OVER 600,000 ALREADY PURCHASED!

TAG Instruments

AUTOMATIC CONTROLLERS
Air-Operated
Cycle
Electric Contact
Humidity
Level
Pressure
Recording
Steam-Operated
Self-Operating
Temperature
Temperature-Time
Timers
Vacuum

GAGES
Absolute Pressure
Differential Pressure
Draft
Recording Pressure
Recording Vacuum

HYDROMETERS
Alcohol
A. P. I.
Baume
Specific Gravity

HYGROMETERS
Indicating
Recording

MOISTURE METERS
Dielectric
Grain
Tobacco
Wood

OIL TESTING INSTRUMENTS
Carbon Residue Apparatus
Closed Tester
Cloud and Pour Test Apparatus
Colorimeters
Distillation Apparatus
Flash and Fire Testers
Float Test Apparatus
Melting Point Apparatus
Penetration Apparatus
Ring and Ball Testers
Sampling, Measuring and Gauging Apparatus
Sulphur Determination Apparatus
Vapor Pressure Bombs
Viscosimeters
Water Determination Apparatus and Other ASTM Apparatus

PYROMETERS
Indicating—Single and Multiple Point
Indicating Controllers
Recording Controllers
Recorders—Single and Multiple Point

RECORDERS
Humidity
Motion
Pressure
Temperature
Vacuum

RECORDER CONTROLLERS
Humidity
Hydrogen Ion
Pressure
Temperature
Vacuum

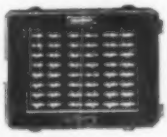
RESISTANCE THERMOMETERS
Indicating—Single and Multiple Point
Indicating Controllers
Recorder Controllers
Recorders—Single and Multiple Point

THERMOMETERS
ASTM
Chemical
Dial
Etched Stem
Industrial
Laboratory
Paper Scale
Recording

VACUUM GAGES
Mercurial

VALVES
Diaphragm
Motor Operated
Reducing
Regulating

Whether the need is for instrumentation to be "designed-in" at the planning stage, or improved instruments for present equipment or processes, the answer will be found in the complete Tag line listed above. Check this list against your instrument requirements, and write to us for complete descriptive literature and prices.



C. J. TAGLIABUE CORPORATION (N. J.)
591 Frelinghuysen Avenue, Newark 5, N. J.

TAG

For More Efficient Filtering ...Mt. Vernon Extra

uniformity makes the big difference

Mt. Vernon Extra's high degree of uniformity means more efficient filtering — greater clarification of filtrates — more efficient recovery of solids. And the rough scrubbing and scraping of filter-fabric cleaning is something that Mt. Vernon fabrics take in their stride.

Mt. Vernon Extra filter fabrics are made from top grades of cotton and scientifically produced under rigid laboratory controls to insure a high degree of fabric uniformity.

For more effective filtering and longer wear, specify Mt. Vernon Extra.

Mt. Vernon-Woodberry Mills

TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

Specify INCONEL . . . the ECONOMY metal for HIGH-TEMPERATURE chemical processing

1. HIGH STRENGTH

2. OXIDATION RESISTANCE

3. RESISTANCE to CHEMICAL ATTACK

INCONEL IS STRONG

Strength, especially *hot-strength*, is the quality designers look for first in metals to be used in high-temperature applications.

INCONEL* *has exceptionally high hot-strength.*

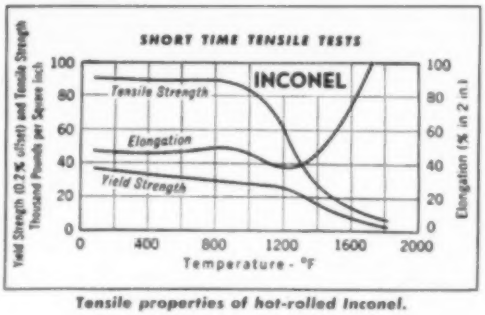
In the heat-treating field, where equipment is constantly exposed to red-heat temperatures, INCONEL has repeatedly set long-time performance records. One fixture made of INCONEL carried full work loads for 13,000 consecutive hours at operating temperatures of 1600° to 2150° F.

INCONEL RESISTS OXIDATION

A metal may resist oxidation at normal temperatures . . . but will it resist oxidation at the high temperatures necessary in processes like natural gas cracking?

INCONEL *will!*

Here's proof: In high-temperature enamel-setting furnaces where oxidation spalling of fixtures cannot be tolerated for fear of ruining expensive finishes — you'll find INCONEL hanger bars standard equipment. INCONEL's tightly-adhering oxide film does not scale to cause product contamination.



Tensile properties of hot-rolled Inconel.

INCONEL RESISTS CORROSION

Where atmospheres are sulfur-free, INCONEL has a plant-proved performance record in successfully handling hot corrosive chemicals such as fatty acids, molten salts, burning gases, sintered metals, ore reductions, and certain organic chemicals at elevated temperatures.

INCONEL IS ECONOMICAL

Get a quotation on INCONEL. You will find it less than you would probably expect. In addition, INCONEL's superior service life and low maintenance requirements often result in outstanding long-run economies.

For economy *plus* serviceability . . . *choose* INCONEL. INCO's Technical Service will gladly help with your specific problems. Your inquiries are always welcome!

*Reg. U. S. Pat. Off.

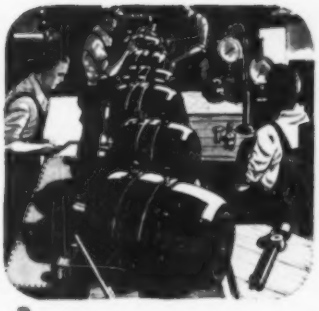
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCONEL* . . . **for long life at high temperatures**

(80 NICKEL—14 CHROMIUM)

1 **1760**—A strong back, sharp axe and plenty of time and patience were a *must* for the frontier homebuilder. He cleared the land, felled his trees, hewed logs to fit and hoped his house wouldn't leak when he finished.

2 **1875**—Lumber, the universal building material, was a budding industry. But woodworking machinery was hard pressed to keep pace with the tremendous demand. Urgently needed was low cost electrical power to boost output.



3 **1915**—Howell "Red Band" Electric Motors appeared. Applied to machines in woodworking and other important industries, these rugged, industrial type motors soon won wide recognition for making good on tough jobs.

WORKING WONDERS WITH WOOD

(Up to 225 Feet Per Minute)

4 **Today**—Electrically powered machines work wonders with wood. This modern moulder, for example, using 5 Howell Industrial Type Motors, can shave, trim and form four sides of a wood strip at the rate of 225 feet every minute . . . job costs are cut . . . *more* people enjoy *more* goods at less cost.

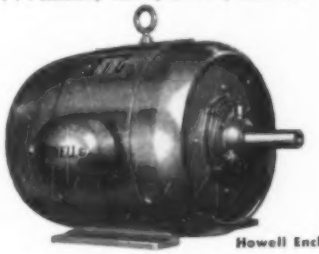
Here's another example of a tough industrial job solved by Howell Motors—the accepted industrial type motor.

Whether it's on planers, moulders, saws, lathes, pumps, fans, conveyors or dairy equipment, dependable, precision-built Howell Motors are an important source of power.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs — provides more goods for more people at less cost.

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.

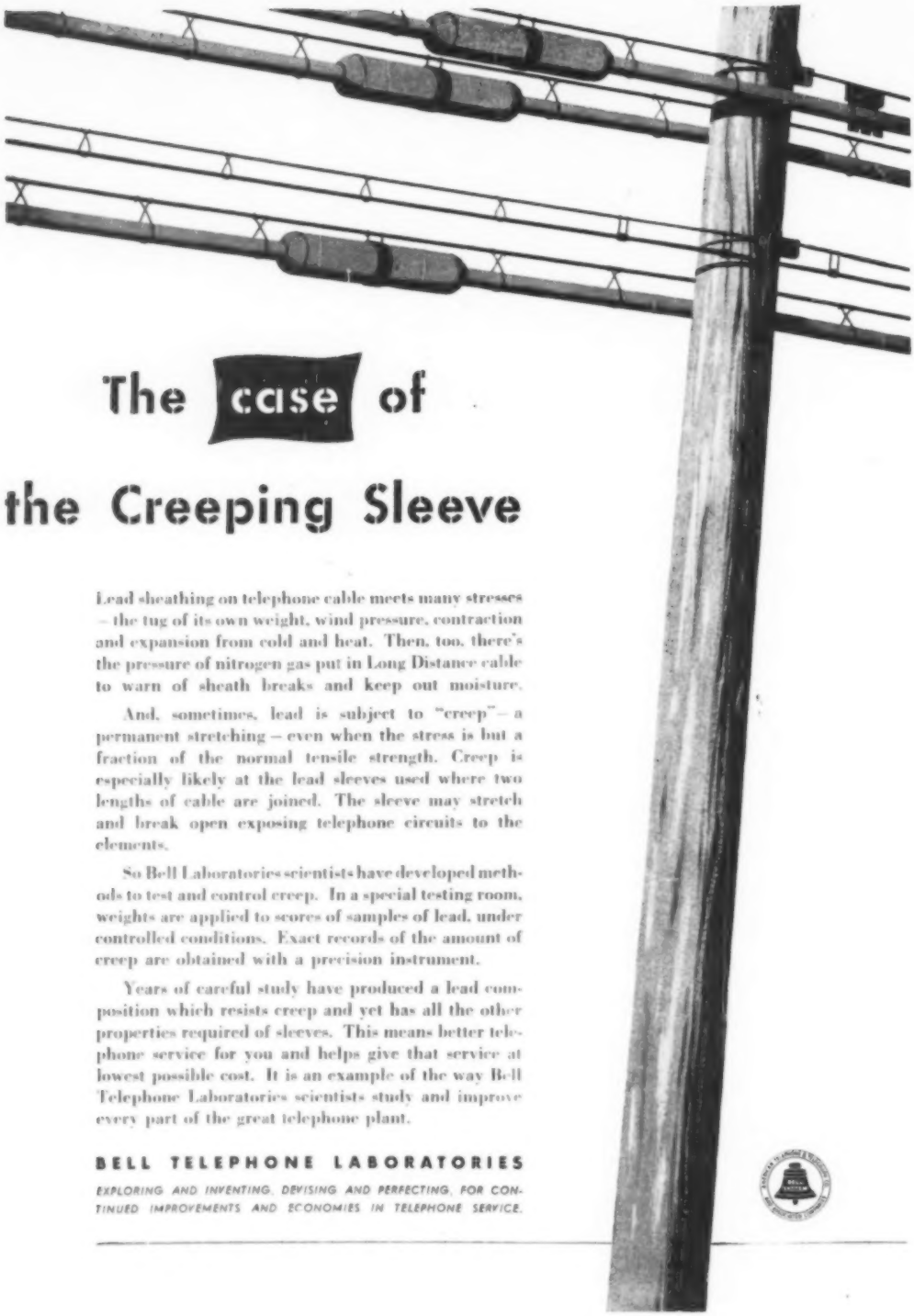


Howell Enclosed, Fan-Cooled Motor—Type K

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915



The case of the Creeping Sleeve

Lead sheathing on telephone cable meets many stresses – the tug of its own weight, wind pressure, contraction and expansion from cold and heat. Then, too, there's the pressure of nitrogen gas put in Long Distance cable to warn of sheath breaks and keep out moisture.

And, sometimes, lead is subject to "creep" – a permanent stretching – even when the stress is but a fraction of the normal tensile strength. Creep is especially likely at the lead sleeves used where two lengths of cable are joined. The sleeve may stretch and break open exposing telephone circuits to the elements.

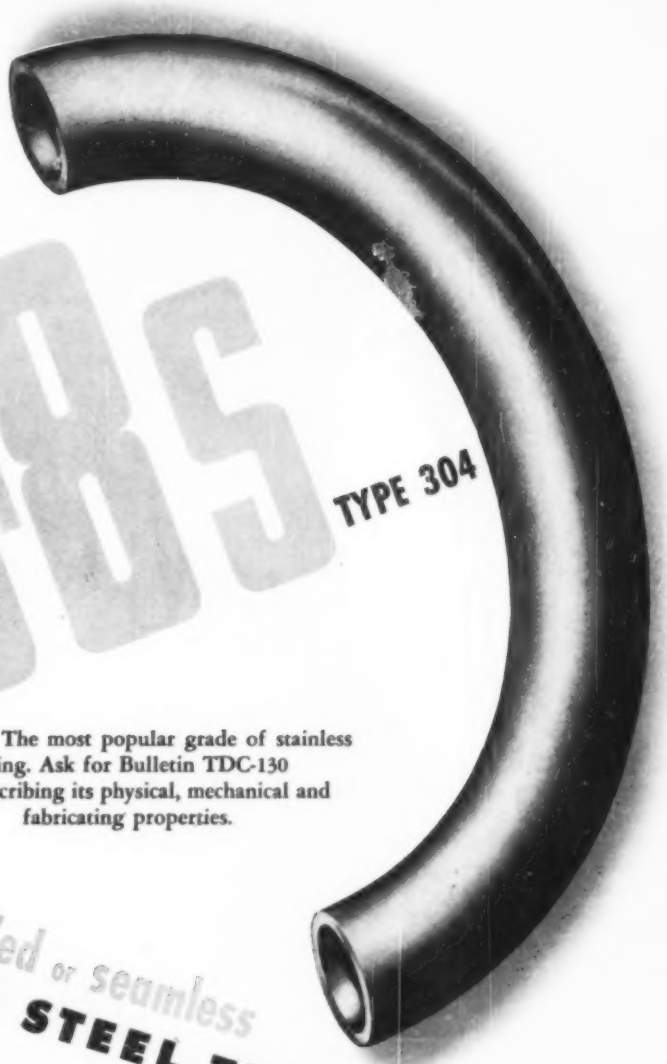
So Bell Laboratories scientists have developed methods to test and control creep. In a special testing room, weights are applied to scores of samples of lead, under controlled conditions. Exact records of the amount of creep are obtained with a precision instrument.

Years of careful study have produced a lead composition which resists creep and yet has all the other properties required of sleeves. This means better telephone service for you and helps give that service at lowest possible cost. It is an example of the way Bell Telephone Laboratories scientists study and improve every part of the great telephone plant.

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE.

Answers
MOST
corrosion
problems



CROLOY 188 TYPE 304

The most popular grade of stainless steel tubing. Ask for Bulletin TDC-130 describing its physical, mechanical and fabricating properties.

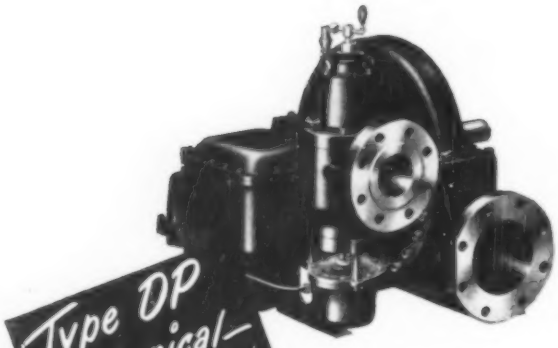
Welded or seamless
STAINLESS STEEL TUBING

THE BABCOCK & WILCOX TUBE COMPANY
General Offices: Beaver Falls, Pa.
Plants: Beaver Falls, Pa. and Alliance, Ohio

BABCOCK & WILCOX SEAMLESS & WELDED TUBES

A full range of Stainless, Alloy and Carbon Steel Tubing for All Pressure and Mechanical Applications.

TA 1465S



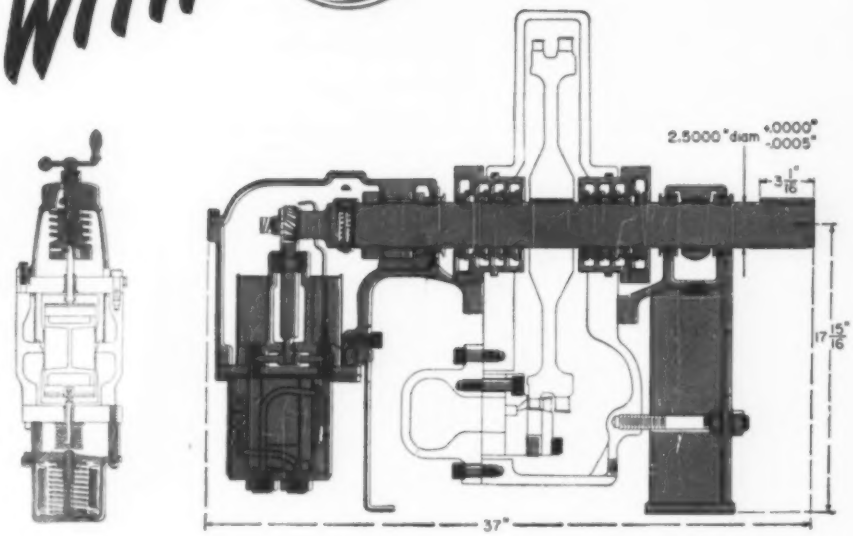
HERE'S HOW YOU SAVE

SAVE ON SPARE PARTS because of high degree of interchangeability of the new Type DP line. (Cross-section drawing shows parts interchangeable on all frame sizes.)

You can reduce your spare parts inventory with this standard kit, containing parts applicable to *all* standard Type DP turbines. With this set of packaged spares you save 75% of price of comparable set of loose spares for previous designs.

With the DP you save money on first cost too. Only G.E. offers hydraulic governing (30% adjustable speed range) on a standard turbine — at no extra cost.

WITH GE TURBINES



PARTS IN COLOR INTERCHANGEABLE ON ALL FRAME SIZES

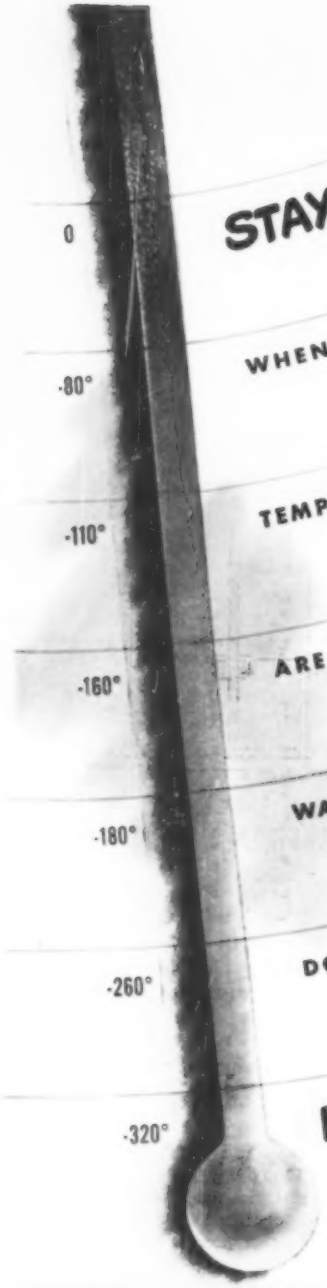
SAVE TIME when installing DP turbines or when relocating them in your plant. (Drawing shows dimensions common to all frame sizes.) Standard shaft height permits you to use a fixed mounting height on all your turbine drives. Standardization of the DP saves time on delivery too—shipment time is approximately 20 weeks.

When it comes to alignment, you'll appreciate the DP center-line support — now standardized on all frame sizes. Center-line support eliminates mis-alignment resulting from expansion from normal heating.

SAVE TROUBLE because of superior design features of the new Type DP — features such as: totally enclosed governing system protected in an oil atmosphere against rusting and sticking (particularly a problem on standby units); nonsparking overspeed trip, suitable for explosive atmospheres; new long-life solid-backed bearings; Monel-sprayed shaft at packings to eliminate corrosion; positive pressure lubrication; balanced valve design, and many other improvements to reduce maintenance.

The new Type DP is not a "standard turbine" for a narrow range of ratings only, but a standardized *line*, in ratings from 10 to approximately 1200 hp, speeds from 1000 to 5000 rpm. Thus, if your turbine drives fall within this wide range, you can save money — time — and trouble — by standardizing on the Type DP. For full information get in touch with your G-E representative. ***Apparatus Department, General Electric Company, Schenectady 5, N. Y.***

GENERAL ELECTRIC

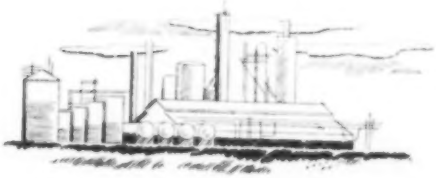


STAYS TOUGH WHEN TEMPERATURES ARE WAY DOWN HERE

Down to −320°F., where other metals crack up, aluminum maintains its impact strength, yield point and elongation. Toughness in extreme cold makes aluminum your best choice for many new chemical processes including tonnage oxygen, natural gas and nitrogen removal plants.

Couple this amazing property with aluminum's other good points to see its economic value. Aluminum is inexpensive in initial cost and fabrication. Equipment is only ½ as heavy made of aluminum as of heavy metals. It machines, casts and welds with standard equipment. Its chemical inertness and corrosion resistance avoid batch and process contamination. Its high thermal conductivity and ductility permit rapid filling of holders with cold liquids.

There's a wealth of technical help for you on all types of process equipment at Alcoa's research center. Consult us about data, designs, tests and pilot equipment. ALUMINUM COMPANY OF AMERICA, 2151 Gulf Building, Pittsburgh 19, Pa.

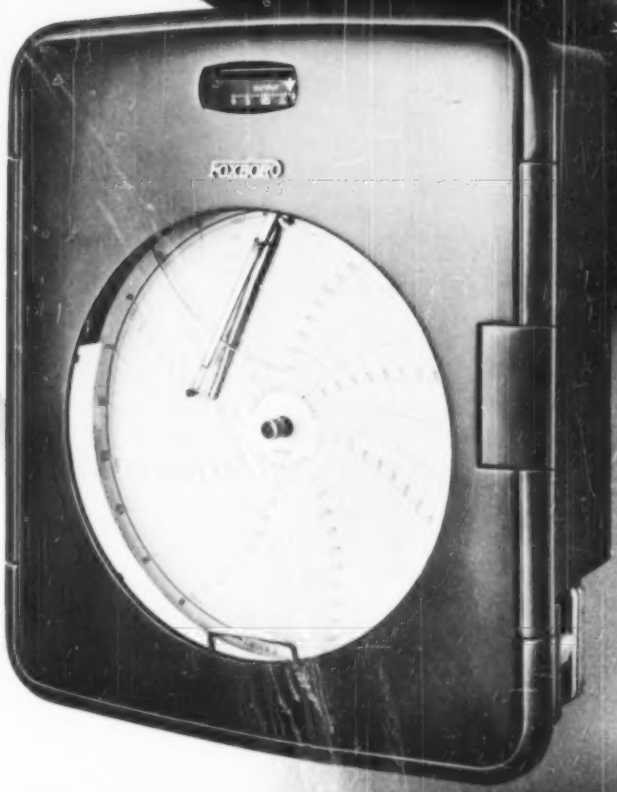


ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

AN "EYE-OPENER" IN

Accessibility



NO GROPING for concealed adjustments! No "sweating out" of awkward alignments! No haphazard arrangement of parts to cause confusion! Every-thing about the Foxboro Model 40 Controller is designed for orderly accessibility as well as precision.

With the door opened, operating controls are all conveniently grouped in the upper right corner. *Instantly accessible!* Pressure reducing valve and transfer switch are equally handy. Simple removal of chart plate (no tools, no pen-removal) makes all working parts easy to reach . . . with unit construction throughout to insure automatic re-alignment, even after disassembly and reassembly.

This outstanding accessibility is only one of many advantages that result from top-to-bottom new design that makes M-40 the finest modern controller!

FOXBORO
REG. U. S. PAT. OFF.

M-40

"THE FINEST MODERN CONTROLLER"

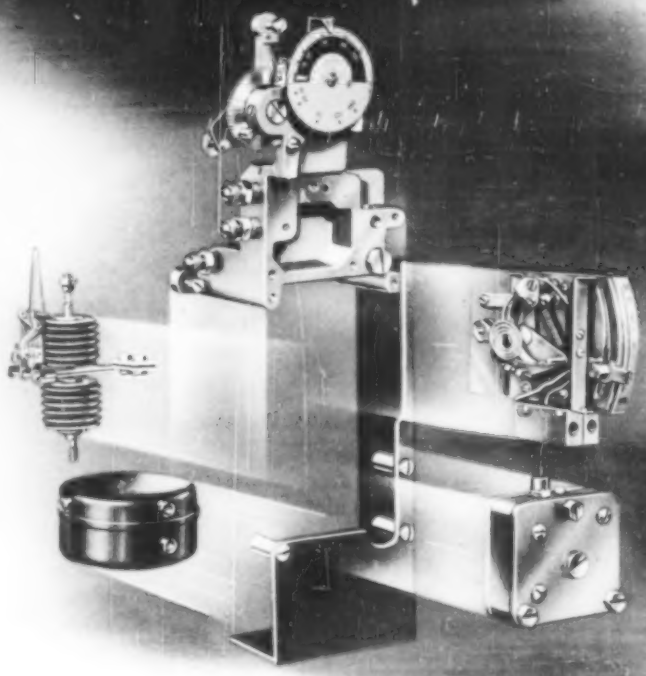
The Model 40 Pneumatic Controller is available for temperature, pressure, flow, liquid level, humidity, density, etc., in a full range of control actions and combinations. Write for Bulletin 381.
The Foxboro Company, 262 Neponset Avenue, Foxboro, Mass., U. S. A.

The only control unit with

PERMALIGNED CONSTRUCTION

The complete Model 40 controller incorporating flapper and nozzle, control relay, hydron system and resistances is actually a series of sub-assemblies mounted on a single, solid base casting. Because of its overall unit construction, sub-assemblies as well as the entire unit may be removed or replaced easily and quickly without destroying original alignments.

Here's a typical example of the *permaligned* construction throughout the M-40 Controller . . . another important reason why instrument men recognize the M-40 as the finest modern controller.



FOXBORO
REG. U. S. PAT. OFF.

M-40

"THE FINEST MODERN CONTROLLER"

Vaportight CONDULETS*

for electrical installations that are exposed to
weather, moisture, steam or non-combustible dusts

JUNCTION CONDULETS - SWITCHES - RECEPTACLES - LIGHTING FIXTURES - CIRCUIT BREAKERS - PANELBOARDS

Type X Ofround Condulet with Blank Cover and Gasket
Type FSC Conduit with Blank Cover and Gasket
Type GUC Conduit with Blank Cover and Gasket
Type LRT Vaportight Conduit
Type E Ofround Vaportight Switch Conduit
Type FS Vaportight Trinle Switch Conduit
Type FSE Vaportight Push Button Station Conduit
Type FSC Vaportight Plug Receptacle Conduit
Type VPR Vaportight Indirect Lighting Conduit 150 – 200 Watt
Type ARC Vaportight Flexible Fixture Hanger
Type FS Vaportight Switch Conduit
Type FD Vaportight Switch Conduit
Type FDC Vaportight Switch Conduit
Type FS Two-Gang Vaportight Switch Conduit
Type FS Vaportight Lighting Fixture
Type FSC Two-Gang Tandem Conduit with Vaportight Switch and Plug Receptacle
Type VDR Vaportight Lighting Conduit 200 – 500 Watt
The illustrations show a representative selection from the hundreds of CONDULETS that are vaportight or when furnished with covers and gaskets become vaportight.
*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.
Type VDR Three-Gang Vaportight Panel Mounting Condulet with Pilot Lights and Switch
Type VCR Vaportight Lighting Fixture for LRS Series Conduits
Type CS Vaportight Lighting Fixture for GS Series Conduits
Type VG Vaportight Lighting Conduit
Type GS Vaportight Lighting Fixture for GS Series Conduits
Type VDR Vaportight Lighting Conduit with Dome Reflector 100 – 200 Watt
Type FSC Two-Gang Vaportight Combination Push Button Station and Pilot Light Conduit
Type V Vaportight Lighting Conduit for Mounting on Machines
Type V Vaportight Heavy Duty Lighting Conduit with Shatterproof Glass
Type VGS Vaportight Type or Dot Light Conduit
Type ARC Vaportight Lighting Fixture for Ofround Conduits
Type VC Vaportight Lighting Conduit
Type V Vaportight Lighting Conduit with Dome Reflector 100 – 200 Watt
Type VDS Vaportight Lighting Conduit
Type VHA Vaportight Lighting Conduit with Flush Hubs
Type VU Vaportight Lighting Conduit for Mounting on a Hand Rod
Type VJ Vaportight Lighting Conduit for Extensions from Concealed Conduit
Type VS Vaportight Hand Lamp with Rubber Handle
Type VHA Vaportight Lighting Conduit with Angle Reflector 100 – 300 Watt
Type DCD 8 Vaportight Lighting Fixture for Wall Mounting
Type VFC Vaportight Gauge Lighting Conduit
Type VW Vaportight Lighting Conduit with Fresnel Lens
Type VJ Vaportight Lighting Conduit
Type VJC Vaportight Gauge Lighting Conduit Fluorescent
Type CSW Vaportight Circuit Breaker Conduit
Type DVSP Dust Tight and Vaportight Panelboard
Type DVSP Dust Tight and Vaportight Panelboard
Type DLP Dust Tight and Vaportight Panelboard

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

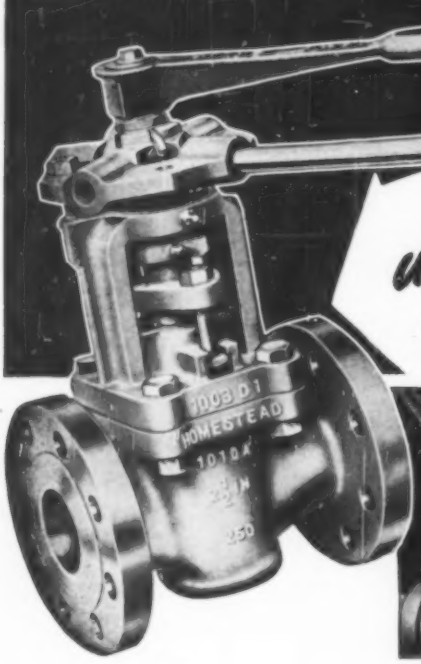
Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington. *Resident Representatives:* Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va.
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

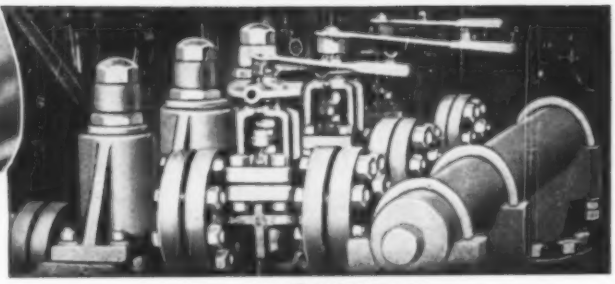
CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

For Never-Failing STICK-PROOF Operation

in Services Involving Extreme Temperatures, Pressures and Corrosive Fluids

use HOMESTEAD LEVER-SEALD VALVES





For more than 15 years HOMESTEAD LEVER-SEALD VALVES have solved the operating difficulties of hundreds of manufacturers in services where temperature extremes, pressure and the corrosive action of line fluids would cause ordinary valves to stick or "seize."

HOMESTEAD LEVER-SEALD VALVES *never* stick. For built into each valve is a powerful lever and screw device which relieves seating pressure between plug and body just enough to overcome friction and permit *easy turning at all times and under all conditions.*

They operate *faster* too . . . 16 to 28 times faster than screw-stem-type valves, because a QUARTER-TURN *fully opens or closes* them. The QUARTER-TURN principle also makes them ideal for installation in restricted areas, next to walls, floors, ceilings, congested piping and other obstructions where many other types of valves could not be operated.

HOMESTEAD LEVER-SEALD VALVES are available in combinations of metals and alloys to meet *your* service requirements. Sizes range from 1¼" to 10" for pressures from vacuum to 1500 pounds. For complete details write for Valve Reference Book No. 38. No obligation.

CHECK THESE OUTSTANDING FEATURES

- **A QUARTER-TURN fully opens or closes valve.**
- **INSTANT STICKPROOF OPERATION. Plug turns freely after seating pressure is relieved by screw lever.**
- **LEAK PROOF. Deep stuffing box and gland prevent leakage.**
- **POSITIVE LEAKLESS SEAL WITHOUT USE OF LUBRICANT is obtained by reapplying full seating pressure with screw lever after opening or closing.**
- **STRAIGHT-LINE FLUID FLOW. No obstructions to cause pressure drop.**
- **SEATING SURFACES ALWAYS PROTECTED in both open and closed positions. Fluid or grit cannot damage valve seat.**
- **SEALED BOTTOM prevents fluid loss and reduces hazards.**

HOMESTEAD VALVE MANUFACTURING CO.

P. O. BOX 13 CORAOPOLIS, PA.

There's an old saw among manufacturers that "you can't please them all," but if this is the rule, Taylor Forge is the exception that proves it!

As for most good things, there's a good reason: Taylor Forge brought and applied to the pipe-welding field a mature forging experience that was *full-grown* long before welding fittings were produced on a commercial scale. And it was this informed experience, alloyed with resourceful forging skill, that Taylor Forge merged in the design of welding fittings which, literally, "have everything."

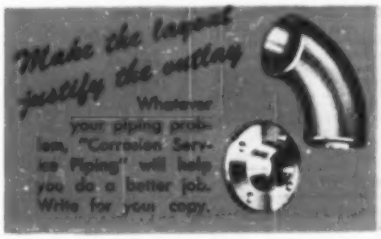
Hence, you find features that appeal to the engineering judgment of the designer and materials engineer, such as engineered strength distribution and close-control metallurgy, as you would expect from fittings made *by* engineers *for* engineers. But you also find features that appeal to their economic sense . . . the common sense of convenience and utility.

These are the low-cost features that justify the preference of the construction superintendent, the maintenance man, and the welding foreman: Tangents that make lining up easier; quarter markings that guide the work; clean lathe-bevels that mean better, faster welding; clear identifications; uniform and geometric dimensional accuracy; widest range of types and sizes.

This array of features that "please them all" is found only in WeldELLS. Why accept less than these?

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS General Offices & Works: Chicago 90, Ill. (P.O. Box 485) Eastern Plant: Carnegie, Pa. Western Plant: Fontana, Calif. • District Offices—New York: 50 Church Street • Philadelphia: Broad Street Station Bldg. • Pittsburgh: First National Bank Bldg. • Chicago District Sales: 208 S. LaSalle Street • Houston: City National Bank Bldg. • Los Angeles: Subway Terminal Bldg.


Make the layout justify the outlay
Whatever your piping problem, "Corrosion Service Piping" will help you do a better job. Write for your copy.

Send me "Corrosion Service Piping"

Name_____

Position_____

Company_____

Street Address_____

City_____ Zone_____ State_____

513-0149

Mail to Taylor Forge & Pipe Works
P. O. Box 485, Chicago 90, Illinois

TWO GREAT NAMES...DODGE-TIMKEN!

It was Dodge who took the famous Timken Bearing, mounted it, sealed it, housed it and delivered a pillow block of new high quality—fully assembled, ready to lock on the shaft and carry the power loads of industry with new efficiency.

Dodge develops *outstanding* power transmission products, as proved by the big success of Dodge-Timken Bearings on millions of industry's toughest jobs.

Dodge-Timken Bearings are supplied promptly from stock in four basic types and a wide range of sizes to meet an almost limitless variety of anti-friction problems.

Dodge also produces Ball Bearing Pillow Blocks which, with Dodge-Timken Bearings, comprise the famous "30,000 hour line." Write for complete bulletins.

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

He is your local Dodge Distributor—factory trained—qualified to suggest ways to improve your machine performance, increase production. Look for his name under "Power Transmission Equipment" in your classified phone book.

Copyright, 1948, Dodge Mfg. Corp.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

SITUATION WANTED
Specially trained Technical Staff; specialized knowledge of *specific industries*; 67 years of experience; impressive record of accomplishments; excellent references from many leading companies. Call or write SOLVAY TECHNICAL SERVICE.
SOAP CHIPS

Next time you run into a technical problem on an operation or process involving SOLVAY products, remember that there is available to you the service of a technical staff *with 67 years of cumulative experience*.

Each man on the SOLVAY TECHNICAL SERVICE staff has an extensive knowledge of the industry he serves . . . he thoroughly knows the uses and applications of alkalies and our other chemicals in that industry.

That's why many leading companies have come to rely on SOLVAY TECHNICAL SERVICE with its wealth of experience and information. They know that our experts have successfully solved problems not ordinarily referred to the technical staff of a producer of chemicals.

SOLVAY TECHNICAL SERVICE is at your service without cost or obligation. Write us about your problem today, in strict confidence.

SOLVAY *Technical Service*
Specialists in Specific Industries

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

NUMBER 1 IN A SERIES EXPLAINING WHY

DUSTUBES COSTS LESS TO MAINTAIN AND OPERATE

Dustube Filters
NO ABRADING METAL CONTACT
EASY TO SHIP, STORE, HANDLE

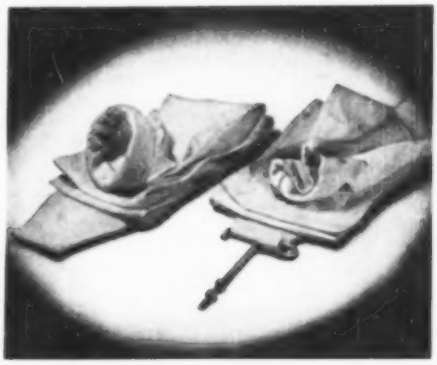
Ease of Inspection
CLEAN, SAFE, SIMPLE
NO PARTS TO REMOVE

Filter Replacement
TAKES ONLY A FEW SECONDS
REQUIRES NO TOOLS

Power Savings
LOWER RESISTANCE TO AIR FLOW
LOWER AIR VELOCITIES

High Efficiency
NEARLY 100% EFFICIENT
BY CONVINCING TESTS

Better Dust Removal
SIMPLE, FAST, THOROUGH
SHORTENS CLEANING TIME



FILTER SIMPLICITY FOR DUST CONTROL ECONOMY

No dust collector is better than its filters. That's why cloth-tube type filters were selected for the American Dustube. Inherent advantages of this simple, effective design provide peak efficiency plus maximum operating economy.

Greater efficiency, because Dustube filters trap all dry dusts, regardless of particle size or concentration, with nearly 100% efficiency.

Greater economy, because filters last longer . . . maintenance is cut to the minimum . . . less power is needed due to lower resistance to air flow. Freely suspended tubes are never under tension nor in contact with abrading metal. Inspections, and infrequent filter replacements, take only a few seconds of one man's time. Filter clearing is fast and thorough with the simplified shaker system.

Investigation will prove these facts. Check up. See for yourself why Dustube is the best investment.

Write for your copy of Catalog 72-A. It explains in detail the advantages of Dustube design.

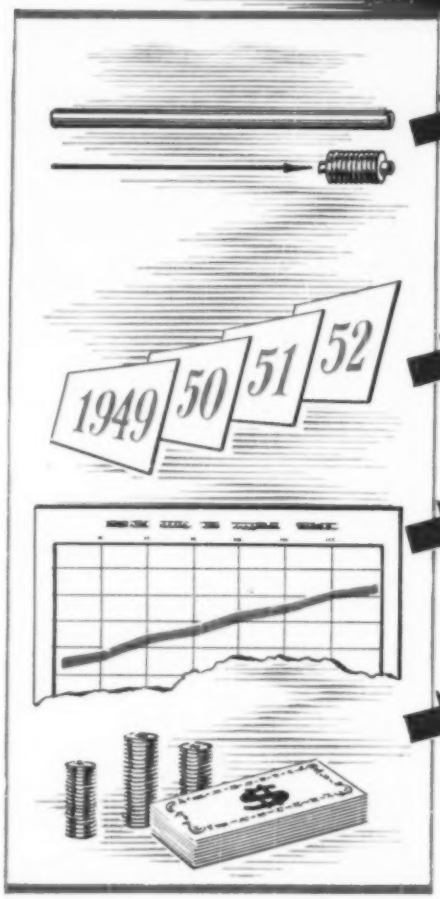
American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
347 S. Byrkit St. Mishawaka, Indiana

dustube
DUST COLLECTORS

IF YOU WANT HIGH EFFICIENCY AND ECONOMY IN CONDENSER AND HEAT EXCHANGER OPERATIONS . . .

Take a look at the Advantages of

WOLVERINE TRUFIN



SPACE SAVING

Trufin will give you 7 to 9 times as much surface area as the equivalent length of plain tube (depending, of course, on the fin height, spacing and diameter). That means that the required surface area can be accommodated in about one-eighth the space when Trufin is used.

LONGER LIFE

Trufin doesn't require frequent replacements. The fins being integral with the tube itself, Trufin will withstand vibration and sudden heat changes.

HIGHER EFFICIENCY

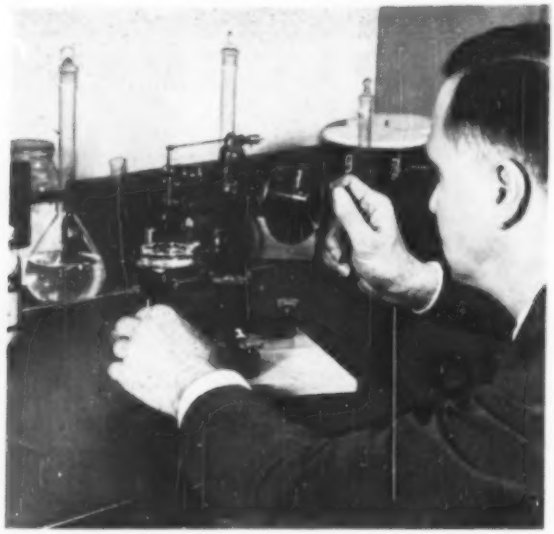
The above-mentioned features are distinctive enough for you to recognize the high potential performance of Trufin. The integral construction of the fins eliminates any possible heat loss between tube and fin.

GREATER ECONOMY

Because only a fraction of Trufin length is required to deliver the equivalent surface area in plain tube—and because Trufin assures longer life and performs at such high efficiency, the economies in using this unique tube are obvious.

WOLVERINE TUBE DIVISION
CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
INCORPORATED
MANUFACTURERS OF SEAMLESS NON-FERROUS TUBING
1427 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Wyandotte Kreelon



Measuring surface tension of Wyandotte Kreelon solutions with du Noüy Tensiometer

lowers surface tension

One advantage of Wyandotte Kreelon is its ability to greatly reduce the surface tension of water and aqueous solutions. The lowering of surface tension is important in many applications of this versatile synthetic organic detergent.

Kreelon also wets out, penetrates, spreads, and emulsifies as it cleans. It functions effectively in acid, alkaline or neutral solutions — in hard or soft water — alone or combined in solutions and dry mixes with a great number of other chemicals. It is supplied in various flake and powder forms. All are white and have a faint, pleasant odor.

The physical and chemical properties of Kreelon make it especially useful in the production of industrial and household cleaning compounds, textiles, leather, insecticides and paper products . . . and in the processing of foods, metals, coal and ore.

Kreelon is readily available and economically priced.

Write for your free copy of the informative 28-page booklet describing the properties and suggested uses of Wyandotte Kreelon.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine • Hydrogen • Dry Ice • Synthetic Detergents
Glycols • Ethylene Dichloride • Propylene Dichloride • Diethylene • Anhydrous Sulfonic Acid Derivatives • Other Organic and Inorganic Chemicals

Wyandotte
REG. U. S. PAT. OFF.

CELANESE* FORMALDEHYDE

Available in Greater Volume

Through expanding production facilities of the **CHEMCEL** plant, at Bishop, Texas, Celanese is making available increased quantities of organic chemicals vital to industry.

Formaldehyde, one of the most important products in the growing family of Celanese* Organic Chemicals, is now offered in greater volume. This high quality, U.S.P. chemical is sold commercially as Formalin, a water white solution containing 40% formaldehyde by volume, 37% by weight. It is obtainable in both methanol inhibited and uninhibited grades.

A clear, colorless liquid, Celanese Formaldehyde is widely used in resins, adhesives and plastics, and in the production of various organic chemicals.

A brochure is available containing specifications and general information on many of the Celanese organic chemicals. Write for your copy—and call Celanese whenever you need technical assistance regarding organics.

CELANESE CORPORATION OF AMERICA
Chemical Division
180 Madison Avenue, New York 16, N. Y.

CELANESE* ORGANIC CHEMICALS NOW IN PRODUCTION:

Formaldehyde	**n-Propyl Alcohol**
Acetaldehyde	**Butyl Alcohols**
Acetic Acid	**Methylal**
Methanol	**Special Solvents**
Acetone	**Tricresyl Phosphates**

FOR LABORATORY EVALUATION, SCHEDULED FOR FUTURE PRODUCTION:

2-Methyl-1, 3-Pentanediol
Propionaldehyde

Celanese Chemicals

*Reg. U.S. Pat. Off.

ALCOHOLS • ALDEHYDES • GLYCOLS • KETONES • ACIDS • SOLVENTS • PLASTICIZERS

FOR YOUR INFORMATION

New Monsanto products mean progress for your business

Among the 25 new Monsanto chemicals described here, you are likely to find one or more that can be profitably applied to your business—now, or later.

For your convenience, each of these Monsanto products is described briefly in terms of suggested uses, properties and availability . . . Also, each product is numbered (B-1, B-2, etc.) for easy identification and reference in asking for further information—either by letter or by simply ringing the appropriate numbers on the coupon on opposite page.

Your request will receive prompt attention—whether it applies to any of the new products listed here, or to any other Monsanto chemicals that may help reduce your production costs, improve product performance and sales.

Detergent MXP

Suggested Uses: In metal cleaning, mechanical dishwashing, dairy and shop cleaning compounds, reclamation of rags and waste, for rendering alkaline detergent powders non-dusty, pressure jet cleaning.

Properties: An industrial detergent comprising a balanced mixture of non-ionic active principal with synergistic alkaline builders possessing superior detergency with minimum sudsing.

Availability: Commercial quantities. (B-1)

Dichlorophthalic Anhydride

$C_6H_2Cl_2(CO)_2O$ Mol. wt., 217.0

Suggested Uses: Preparation of alkyd resins, plasticizers and other modified phthalate derivatives.

Properties: Practically white flakes consisting of a mixture of isomers; b.p., about 220° C. (40 mm.); m.p. range, 80–140° C.

Availability: Semi-commercial quantities. (B-2)

3,4-Dimethoxybenzyl Alcohol

$(CH_3O)_2C_6H_3CH_2OH$ Mol. wt., 168.2

Suggested Uses: Preparation of aromatic products and as an intermediate for synthesis.

Properties: Practically colorless, water-soluble liquid; b.p., about 174° C. (15 mm.); crystallizing point, approximately 22° C.; Sp. G., 1.17 at 25°/25° C.

Availability: Semi-commercial quantities. (B-3)

3,4-Dimethoxyphenylacetic Acid

$(CH_3O)_2C_6H_3CH_2CO_2H$ Mol. wt., 196.2

Suggested Uses: As an intermediate for synthesis.

Properties: White, microcrystalline solid; m.p., 98–99° C; very slightly soluble in cold water, moderately soluble in hot.

Availability: Semi-commercial quantities. (B-4)

3,4-Dimethoxyphenylacetonitrile

$(CH_3O)_2C_6H_3CH_2CN$ Mol. wt., 177.2

Suggested Use: As an intermediate in chemical synthesis.

Properties: Nearly white, crystalline solid; cr. pt., 64–65° C.

Availability: Semi-commercial quantities. (B-5)

beta-3,4-Dimethoxyphenylethylamine

$(CH_3O)_2C_6H_3CH_2CH_2NH_2$ Mol. wt., 181.2

Suggested Use: As an intermediate for synthesis.

Properties: Colorless to pale yellow liquid; b.p., about 156° C. (10 mm.); cr. pt., approximately 15° C.; Sp. G., 1.08 at 28°/4° C. Undergoes all the reactions characteristic of primary amines.

Availability: Semi-commercial quantities. (B-6)

N,N-Dimethylcarbamyl Chloride

$(CH_3)_2NCOCl$ Mol. wt., 107.5

Suggested Uses: As acylating agent in Friedel-Craft reactions involving acid chloride-type reactions, and as esterifying agent to form carbamates and ureas.

Properties: Colorless liquid, strong-smelling lachrymator; b.p., 167° C.; m.p., minus 33° C.; Sp. G., 20°/4°, 1.678; refractive index at 22° C., 1.45196. Soluble in ether, carbon bisulfide, benzene.

Availability: Laboratory quantities. (B-7)

Methylcyclohexylammonium N,N-methylcyclohexyldithiocarbamate

$CH_3(C_6H_{11})N.CS_2.SH.NH(C_6H_{11})CH_3$

Mol. wt., 302.0

Suggested Uses: Vulcanization accelerator for rubber and rubber latex.

Properties: Color, pale straw-yellow crystals; m.p., 120-123° C.; Sp. G., 1.115; sol. in water, 2.2% at 25° C., very soluble in acetone, methyl-, ethyl-, isopropyl alcohol, ethyl acetate, benzene, chloroform and carbon tetrachloride; slightly soluble in water; insoluble or very slightly soluble in heptane.

Availability: Experimental quantities. (B-8)

Nifos®-T

Suggested Uses: Insecticide and rodenticide.

Properties: Commercial product containing as chief active ingredient 40% tetraethyl pyrophosphate, $(C_2H_5O)_4P_2O_5$, mol. wt., 290.2. Straw to brown-colored liquid; Sp. G., 1.19 at 25°/25° C. or 10.0 lbs./gal. Highly effective against insects and mites at low concentrations. Miscible with water, aromatic and polar solvents; immiscible with paraffinic solvents. In the presence of moisture, Nifos-T hydrolyzes to relatively non-toxic, water-soluble products, avoiding problems of toxic residues. May be applied as spray, dust or aerosol. Toxic to animals, but relatively non-toxic to most plants at working concentrations.

Availability: Commercial quantities. (B-9)

Niran® brand of Parathion (O,O-diethyl O-p-nitrophenyl thiophosphate)

$(C_2H_5O)_2PSOC_6H_4NO_2$ Mol. wt., 291.3

Suggested Use: Insecticide.

Properties: Dark brown liquid; Sp. G., 1.27 at 25°/25° C. or 10.6 lbs./gal. Insecticide of high activity against a very wide variety of insects and mites. Miscible with aromatic and polar solvents; only slightly miscible in paraffinic solvents and water. Relatively non-corrosive to metals of construction and containers. Applied as spray, dust, dust suspension or aerosol. Toxic to animals. Low plant toxicity.

Availability: Semi-commercial quantities. (B-10)

beta-Phenylethylamine

$C_6H_5CH_2CH_2NH_2$ Mol. wt., 121.2

Suggested Uses: As an intermediate for chemical synthesis and as a precursor in penicillin manufacture.

Properties: Colorless to slightly yellow liquid; b.p., about 200° C. (760 mm.); Sp. G., 0.96–0.97 at 15.5°/15.5° C. Undergoes all the reactions characteristic of primary amines; may be used as a liquid or in the form of the acetate or hydrochloride in aqueous solution.

Availability: Commercial quantities. (B-11)

Di-beta-phenylethylamine

$(C_6H_5CH_2CH_2)_2NH$ Mol. wt., 225.3

Suggested Use: Intermediate for chemical synthesis.

Properties: Colorless to slightly yellow liquid: Sp. G., 1.00 at 25°/25° C.; b.p., approximately 204° C. (22 mm.).

Availability: Research quantities. (B-12)

Potassium Phenylacetate (64%)

Suggested Uses: As a penicillin precursor and as a chemical intermediate.

Properties: A 64% aqueous solution of the potassium salt of phenylacetic acid; Sp. G., 1.26 at 25°/25° C.; refractive index, 1.477 at 25° C.

Availability: Commercial quantities. (B-13)

Santicizer® 141

Suggested Uses: Designed specifically as a primary plasticizer for polyvinyl chloride and polyvinyl chloride-acetate and suggested for use in coated textiles, free films, tablecloths, shoe soles and floor tiles, as well as in such products made from Buna-N type synthetic rubber as diaphragms, hose and conveyor belting.

Properties: A new, non-volatile plasticizer of the aryl-alkyl type, imparting excellent low-temperature flexibility and flame-proofing qualities to polyvinyl chloride, polyvinyl chloride-acetate and Buna-N type synthetic rubbers. Light-colored liquid with slight odor; b.p., approximately 375° C. (760 mm.), fluid at minus 30° C.; Sp. G., 1.09 at 25° C.; refractive index, 1.51–1.52 at 25°/25° C.

Availability: Commercial quantities. (B-14)

Santicizer 160

Suggested Uses: Textile coatings, plastics, protective coatings and electrical insulation.

Properties: A new, phthalate type plasticizer for polyvinyl chloride, polyvinyl chloride-acetate, polyvinyl butyral, ethyl cellulose and nitrocellulose. Water-white, oily liquid with faint characteristic odor; b.p., approximately 370° C. (760 mm.); glassy at minus 40° C.; Sp. G., 1.12 at 25°/25° C.; refractive index, 1.53–1.54 at 25° C. Has superior permanence, oil resistance, flexibility and stability.

Availability: Commercial quantities. (B-15)

Santodex®

Suggested Use: Designed specifically to improve the viscosity index of lubricating oils.

Properties: All-hydrocarbon, viscous, light-colored oil additive. Typical inspection data are: Sp. G., 0.899 at 60°/60° F.; viscosity, 30,000 S.U.S. at 100° F., 1,900 S.U.S. at 210° F.; flash point, 350° F.

Availability: Commercial quantities. (B-16)

Santophen® 1

(ortho-Benzyl-para-chlorophenol)

$C_6H_5CH_2C_6H_3ClOH$ Mol. wt., 218.6

Suggested Uses: Germicide and general disinfectant.

Properties: Nearly colorless, dry, non-dusting flaked solid; faint, pleasant phenolic odor; m.p., approx. 49° C.; cr. pt., 45.0–47.0° C.; refractive index (@ 55° C., 1.591–1.592; Sp. G., 1.203–1.206 at 55°/25° C.; b.p., approx. 175° C. (@ 5 mm.; free bulking density, approx. 30.5 lbs./cu. ft. Possessing a unique combination of properties desired in a germicide, Santophen 1 is highly toxic to bacteria and fungi, convenient to formulate and safe to use. Specific applications include sanitizing rest rooms; sterilizing floors, walls and equipment in hospitals; deodorizing garbage cans; disinfecting poultry and livestock shelters; treating locker room floors and premises of swimming pools for control of athlete's foot. Solubilized with alkali, Santophen 1 is not considered corrosive to most metals or other engineering materials. Therefore, its formulations, particularly with soaps, are applicable for cold instrument sterilization and for disinfecting metal containers.

Availability: Commercial quantities. (B-17)

Santopoid® 29

Suggested Use: Gear lubricant additive for hypoid and other gears.

Properties: Amber, viscous oil additive; Sp. G., 1.09 at 60°/60° F.; flash point, 295° F.; pour point, 45° F.; viscosity, 268 S.U.S. at 100° F., 48 S.U.S. at 210° F. Designed to provide in a single gear lubricant the performance characteristics necessary for lubricating hypoid and other gears under the diverse conditions of high-speed passenger car, heavy-duty truck, bus and tractor-trailer service.

Availability: Commercial quantities. (B-18)

Santovar® S

Suggested Uses: Rubber antioxidant for white and light-colored articles.

Properties: An alkylated polyhydroxy phenol, M.W., 318.0; Sp. G., ca. 1.10; soluble in ethanol, ether, dioxane, benzene and carbon tetrachloride. Color, clear, amber to orange resin.

Availability: Commercial quantities. (B-19)

Santowhite®

Suggested Uses: Rubber antioxidant for white and light-colored articles.

Properties: Dialkyl phenol sulfide, M.W., 358.0; Sp. G., 1.097; m.p., 145° min.; color, light gray to light tan powder; soluble in ethanol, acetone, ethyl acetate, ether, hot chloroform, benzene, chlorobenzene and carbon tetrachloride.

Availability: Commercial quantities. (B-20)

Sodium Copper Polyphosphate

Suggested Use: Fungicide for preservation of seeds.

Properties: Complex alkali-heavy-metal phosphate glass; sparingly soluble in water; dense blue powder.

Availability: Laboratory quantities. (B-21)

Sodium Lead Polyphosphate

Suggested Use: Biocide.

Properties: Complex alkali-heavy-metal phosphate glass; sparingly soluble in water; dense white powder.

Availability: Laboratory quantities. (B-22)

Sterox® CD

Suggested Uses: For compounding alkaline, neutral or acid detergent mixtures for industrial cleaners, bottle washing, metal cleaning, dishwashing, dairy and shop cleaning, for rendering alkaline detergent powders non-dusty.

Properties: Non-ionic, slightly basic, powerful detergent fluid of minimum sudsing properties. Viscous liquid weighing approximately nine lbs./gal., which is readily miscible in water, with reduced solubility at elevated temperatures. Compatible and effective in combination with cationic surface-active agents, including quaternary ammonium compounds.

Availability: Commercial quantities. (B-23)

Sterox SE and SK

Suggested Uses: Compounding metal and industrial cleaners, herbicide and germicide emulsions, hand dishwashing compounds, soldering compounds.

Properties: Non-ionic surface-active agents and detergents of high wetting efficiency. Reddish, yellow liquids miscible with a large number of organic solvents; partially soluble in most aliphatic hydrocarbons. Flame and flash point, ASTM open cup, greater than 200° C.

Availability: Pilot plant quantities. (B-24)

2,4,5-Trichlorophenoxyacetic Acid

$C_6H_2Cl_3OCH_2CO_2H$ Mol. wt., 255.5

Suggested Use: Herbicide for control of woody vegetation.

Properties: Light tan solid; m.p., 151–153° C.; insoluble in water, soluble in alcohol; readily forms sodium and alkanol amine salts. Used as the above salts, or in the form of an ester, as an herbicide. Hormone type compound having high plant toxicity.

Availability: Commercial quantities. (B-25)

*Reg. U. S. Pat. Off.

★ ★ ★

MONSANTO CHEMICAL COMPANY, Desk A, 1702 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Houston, Akron, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada Limited, Montreal.

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MAIL THIS COUPON . . . FOR FURTHER INFORMATION

MONSANTO CHEMICAL COMPANY
Desk A, 1702 South Second St.
St. Louis 4, Missouri

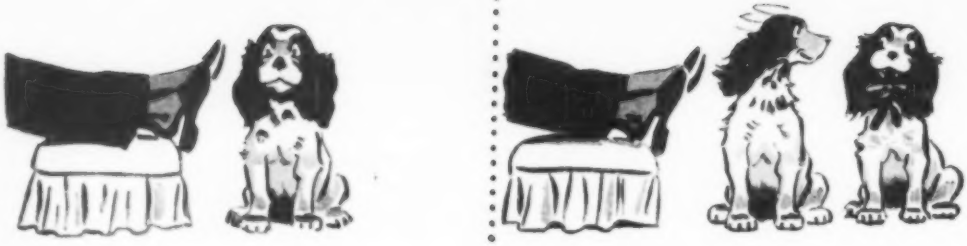
Please send: Further information Samples of the following Monsanto products: B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, B-10, B-11, B-12, B-13, B-14, B-15, B-16, B-17, B-18, B-19, B-20, B-21, B-22, B-23, B-24, B-25 (ring key numbers).

Name ..... Title .....

Company .....

Address .....

City ..... State .....



For just a little extra

You can get a lot more

AL

W&D 2171

Allegheny Metal yields benefits that repay you many times over in lifetime beauty and utility. Wherever you need to combat corrosion and heat, or secure great strength with light weight, use this time-tested stainless steel. It vastly increases service life—vastly reduces maintenance and depreciation costs. • Compared on all counts, Allegheny Metal is *cheapest* in the long run!

Complete technical and fabricating data—engineering help, too—yours for the asking.

ALLEGHENY LUDLUM STEEL CORPORATION

The Nation's Leading Producer of Stainless Steel in All Forms

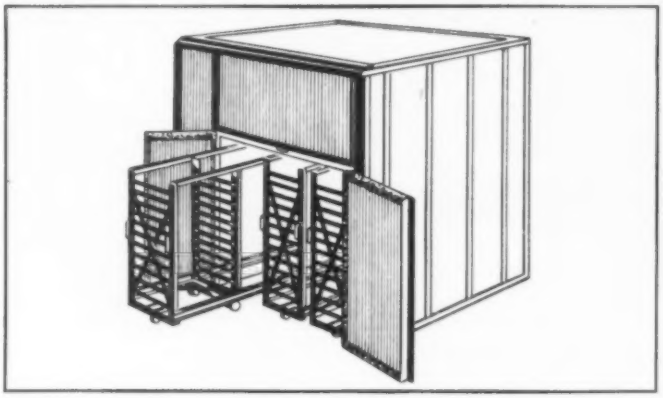
AL

Pittsburgh, Penna. . . . Offices in Principal Cities

Allegheny Metal is stocked by all Jos. T. Ryerson & Son, Inc., Warehouses

PUBLISHED MONTHLY FOR PROCESS INDUSTRIES EXECUTIVES AND OPERATING PERSONNEL

TRUCK DRYING OFTEN MEETS NEEDS WHERE CONVEYOR SYSTEMS PROVE IMPRACTICAL



Proctor Three-Truck D-yer

Often products are not well suited to continuous conveyor drying. In such cases Proctor truck drying systems are employed with marked success.

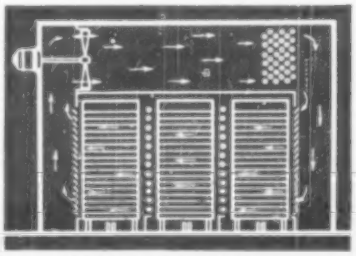
With some products, the physical characteristics simply will not permit continuous conveyor drying. With other products the output requirements are higher than the highest possible with tray dryers and yet not sufficient to efficiently use a huge continuous conveyor system.

PERIODIC AND PROGRESSIVE TYPES

Truck dryers fall generally into two classifications, periodic, where the trucks remain in one position once placed in the drying enclosure, and progressive, which is usually described as a tunnel-truck dryer. In the latter the trucks are moved through the drying enclosure from the feed to the delivery end.

Proctor engineers have design:d many installations of both types, in sizes to accommodate individual plant and product requirements.

With periodic truck dryers the arrangement of trucks depends upon plant requirements and available space. For example a six truck dryer may be arranged 3 trucks wide by 2 trucks deep or 2 trucks wide by 3 deep. Trucks may be put in and removed from the same end of the dryer or may be fed to one end and removed from the other—again depending upon floor space available.



Cross-Section of Three-Truck Dryer

With the progressive type, again, the size and arrangement of the dryer will depend upon output requirements and existing floor space. Progressive tunnel truck dryers are usually long and the drying rate relatively slow. These systems are often employed for handling items such as molded insulation and rayon cakes.

Careful study of a plant's requirements will reveal when a truck drying system is best suited. When this has been determined Proctor engineers are in position to recommend the type and size of system to exactly meet the needs.

TYPICAL MATERIALS HANDLED IN PROCTOR TRUCK DRYERS

MOLDED INSULATION
ELECTRICAL PORCELAIN
RAYON CAKES
COLORS and PIGMENTS
FILTER PRESS CAKES
CHEMICAL PRODUCTS
CERAMIC PRODUCTS
PHARMACEUTICALS

Much Proctor drying equipment and textile machinery is covered in full or in part by patents or patents pending.

PROCTOR & SCHWARTZ, INC. • 7TH TABOR ROAD • PHILADELPHIA 20, PA.

STRUTHERS WELLS

HEADQUARTERS

EQUIPMENT USED IN THE

EVAPORATION of FOOD PRODUCTS

The double effect evaporator installation shown is typical in the food processing industry. The natural circulation, Vertical High Velocity design serves to good advantage in vacuum operation on all except very heavy, viscous materials, and is well adapted to continuous flow operation, which minimizes time of exposure to boiling temperatures.

The design shown provides full accessibility to all surfaces for cleaning, with quick opening covers designed for easy handling wherever access is needed.

All interior parts are highly polished, with no crevices, and external finish is arranged to provide freedom from pockets where spoilage could occur.

Struthers Wells brings to the food industry the knowledge of heat transfer and processing developed through years of experience in chemical process work. The application of these basic principles to the problems of food processing assures sound, yet advanced design in pasteurizing, deaerating, and evaporating equipment.

Write for informative technical bulletins on your company letterhead.

Struthers Wells

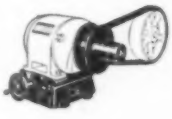
STRUTHERS WELLS CORPORATION
PROCESS EQUIPMENT DEPARTMENT
WARREN, PENNA.
PLANTS AT WARREN, PA. and TITUSVILLE, PA.

"No, no, Bascom! Just a screwdriver!
This machine is Reeves-equipped!"

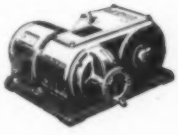
THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 15 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



Maintenance of machines equipped with REEVES Speed Control requires no special tools—no special training. REEVES units incorporate an operating principle proved in more than 260,000 installations. Simplicity of design and rugged construction throughout, with all working parts easily accessible, assure low-cost, trouble-free service. And on the job, REEVES Variable Speed Drives give you smooth, instant speed changes—provide *exactly* the right speed for every job under every changing condition. Result: increased production . . . improved, uniform quality . . . lower production costs. Install REEVES Speed Control on machines now in service—specify "REEVES-equipped" whenever you buy new machines.

• • •

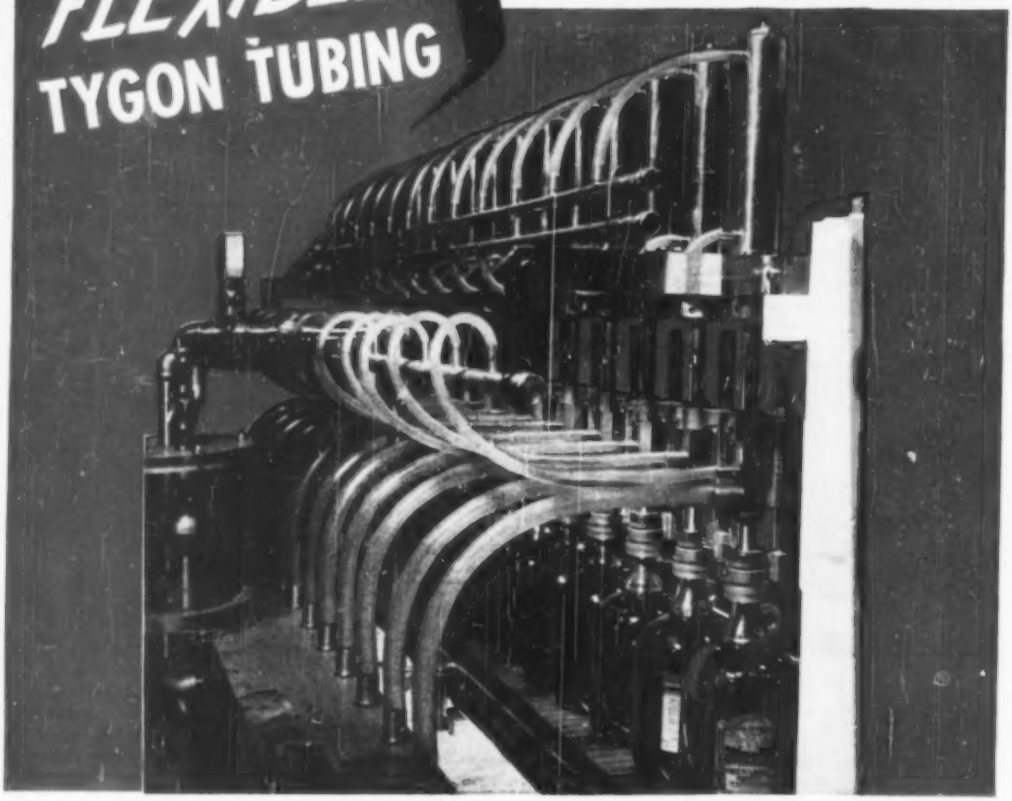
FREE! A new, 16-page handbook no production man should be without, entitled "REEVES Automatic Production Control." Contains comprehensive information on the application of automatic production control to many different machines, under widely varying conditions. Write today for Catalog No. CE19-G487.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE
Reeves Speed Control
GIVES THE RIGHT SPEED FOR EVERY JOB!

USE... *FLEXIBLE* TYGON TUBING FOR FLEXIBILITY IN FLUID HANDLING



FLEXIBLE
•
TRANSLUCENT
•
CORROSION RESISTANT
•
NON-TOXIC

We'll be glad to discuss the use of Tygon Tubing in detail with your engineering staff. When you write please give complete information: solutions handled, temperatures, viscosity and planned use.

CLEAR, flexible Tygon plastic Tubing offers a better piping medium where "give" is important; where solution visibility is desirable; where freedom from solution contamination is necessary.

Flexible as a piece of string, tough as rhinoceros hide, Tygon plastic Tubing laughs at vibration or flex stress. Its glass smooth interior surface speeds fluid flow; a range of standard formulations will handle the most susceptible chemicals, beverages or food products without imparting taste or odor; it may be steam sterilized. It may be made with external braid re-inforcing for high pressures, and, of importance to cost-conscious minds, Tygon Tubing lasts almost indefinitely.

U. S. STONEWARE
Akron 9, Ohio

THE Chementator

Reg. U.S. Pat. Off.

COMMENTS ON THE NEWS OF CHEMICAL ENGINEERING IN INDUSTRY

Volume 56 JANUARY • 1949 Number 1

Big penicillin plant is slated for Western Germany. It will be erected at the former I.G. Farben Works in Hoechst, near Frankfurt. Merck has the contract for designing and equipping the plant. Manufacture will be by the deep fermentation method. Farbwerke-Hoechst will own and operate the plant. When production gets under way Merck will be paid on a royalty basis.

Germany's penicillin needs are estimated at 80 billion to 90 billion international units a month. Capacity at present is not more than 10 percent of that amount. The projected plant is expected to have a capacity of about 100 billion units a month.

•

$25 million soda ash project of Westvaco in Wyoming may have to be abandoned. Largest U.S. trona deposit known has recently been discovered in Wyoming. It covers 30 sq. mi. and may extend over an area of 400 sq. mi. Trona can be heated to produce soda ash in a far cheaper operation than the present manufacturing process for making soda ash. Already Westvaco has spent about $2 million as part of a $25 million program to develop a 360,000-ton annual production of soda ash. But there are no soap mills or glass factories close to these large trona deposits to absorb the soda ash produced from them. Westvaco can only sell the soda ash by absorbing freight to compete in the large consuming areas with present soda ash plants strategically located in the East and on the Pacific Coast. So unless Congress gives manufacturers the legal right to pay part of the freight cost in selling their goods, Westvaco cannot risk the capital to develop the Wyoming trona. Thus if f.o.b. mill pricing is required by law, a vast chemical enterprise will die aborning.

•

Ammonium sulphate plant at Salem, Ore., is up for sale by War Assets Administration. Bids are being accepted on the $5.2 million installation, which extends over 103 acres and has an annual ammonium sulphate capacity of 70,000 to 75,000 tons. WAA says the plant can be adapted to production of phosphate fertilizer components and to fertilizer mixing. At present it is under interim lease to Columbia Metals Co. The lease expires at the end of June in 1949. Columbia Metals had opened negotiations with WAA to buy the plant, but later backed out. Most current production goes to the Far East. But the plant also serves a U.S. market of more than 100,000 farms.

•

Welcoming the Red Dean of Canterbury is dangerous business these days, particularly for a renowned chemist who is urging fair treatment for scientists under government investigation. Yet that is just what Dr. Linus C. Pauling, chairman of the Division of Chemistry and Chemical Engineering at California Institute of Technology and ACS president-elect, has been doing. Pauling served as chairman of a Los Angeles Committee to Welcome the Dean of Canterbury when that dignitary, Dr. Hewlett Johnson, arrived in Los Angeles to speak. Pauling is a sponsor of the new Scientists' Committee on Loyalty Problems. He and other directors of the National Council of Arts, Sciences and Professions have urged President Truman to scuttle his Loyalty Order. No doubt Pauling, a world-famous theoretical chemist, is a sincere liberal. But he is skating on thin ice. Can it be that he has been taken in by a front organization?

•

Bargaining agent for scientists at the Emeryville, Calif., laboratories of the Shell Development Co. is the Association of Industrial Scientists. The Association has finally reached agreement with the Shell management on a contract. Approved by the Association membership, the contract provides for a 7½ percent salary increase, retroactive to July 1, 1948. (The Association had asked for a 12 percent increase, retroactive to Jan. 1, 1948.) Delay in reaching agreement was due to: (1) Shell's insistence that the Association should not bargain on salary mat-

(*Continued on page 70*)

POWELL VALVES start their

Fig. 1793—Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", inclusive. Has outside screw rising stem, bolted flanged yoke and tapered solid wedge. Also available in All Iron for process lines.

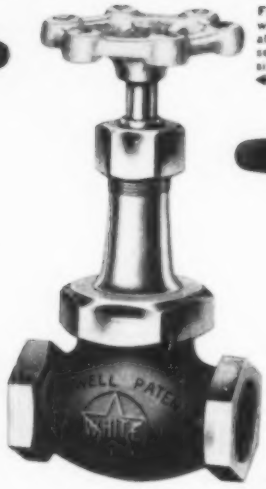


Fig. 1798—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable wear-resisting "Powellium" nickel-bronze disc.

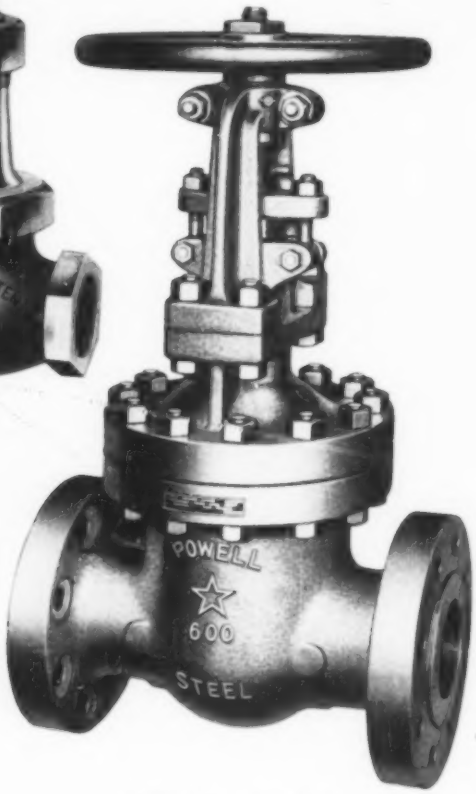


Fig. 6003—Class 600-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke and tapered solid wedge.

POWELL

103rd year of service to Industry

—and the Powell record of satisfactory performance through all the past years is your guarantee for the future.

A century is a long time to concentrate on making valves—and nothing but valves. But it's not only important *how long* you've been doing something but also *how well.*

The fact that, in all these years, Powell has never failed to produce the *right* valves to satisfy every industrial need, is real "service."

As we start our 103rd year, there's a Powell Valve of correct design *and material* for every one of your flow control requirements. And, as new conditions bring new demands, there will be Powell Valves to meet them.

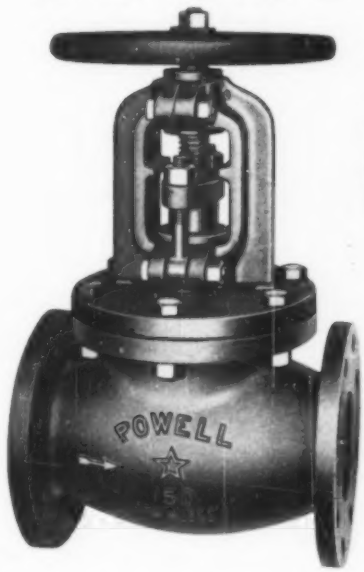


Fig. 2429—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem.

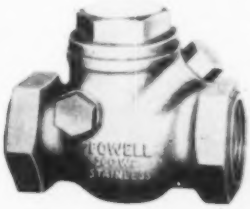


Fig. 1847—200-pound Stainless Steel Swing Check Valve with screwed-in cap and regrindable, renewable disc. ←

Powell Valves for Corrosion Resistance are made in the widest range of metals and alloys ever used in making valves.

For full information on applications of these valves, see Powell Catalog No. 242.

Fig. 2061—150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke and outside screw rising stem. →

The Wm. Powell Company, Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

VALVES

(*Continued from page 67*)

ters; and (2) the Association's attempt to improve vacation benefits for its members. In a compromise, Shell agreed to bargain with the Association on general salary increases and the Association agreed to allow Shell to grant merit increases without bargaining. On the vacation issue, Shell granted some improvements. Unique provision of the contract: the matter of salary increases may be discussed at "reasonable" times by either party. Also, Shell will try to send even more of its professional scientists to scientific meetings and will encourage the publication of scientific papers. Credit for an assist on the agreement goes to Federal Conciliation and Mediation Service. The contract will run for one year.

An independent organization, the Association of Industrial Scientists was formed early in 1943 for two purposes: (1) to provide a means for the 330 chemists, physicists and engineers in the unit to express their needs to management; and (2) to prevent representation being secured by the left-wing Federation of Architects, Engineers, Chemists and Technicians, CIO (later fused with the UOPWA). The AIS stymied FAECT's drive to obtain representation in an NLRB election. After winning a two-year fight against a company-domination charge brought by FAECT, the AIS went on to win its own election in February 1947.

The Association is working with similar organizations at Standard Oil Co. of Indiana and the Humble Oil Co. of Baytown, Tex. It is cooperating with the National Professional Association of Engineers, Architects and Scientists, a West Coast group composed largely of professional engineers, many of whom are employed by aircraft and power companies. All of these organizations have as their goal increased rewards for industrial scientists. Compensation of scientists, they maintain, is not commensurate with their contributions to society. Nor is it comparable with returns to the medical and legal professions or with gains chalked up by craft and industrial unions.

•

Financial structure of Rohm & Haas has come to light in a stock prospectus issued by the Department of Justice through its Office of Alien Property. The Department has asked for bids on 15,815 shares of $4 cumulative preferred stock and 197,697 shares of common, representing 25.7 percent of each class.

Rohm & Haas is known for production of leather-finishing chemicals, insecticides, acrylic plastics and ion-exchange resins. Founded in 1909 by Otto Haas and Dr. Otto Rohm, the company was an offshoot of Rohm & Haas of Darmstadt, Germany, also founded by Dr. Rohm. Dr. Rohm died in 1939 and the shares now being offered were held in a trust for his children. They were seized by the Alien Property Custodian in 1942. Otto Haas, an American citizen, is the chief stockholder, owning 274,505 shares. He also owns 40 percent of the German Rohm & Haas.

The company had total assets of $46,923,683 on Sept. 30, 1948. This included $23,716,047 current assets, with nearly $8 million in cash and $22 million in fixed assets. About $25 million was invested in plants and properties from Jan. 1, 1943, to Sept. 30, 1948. This included an $8 million plant in Houston to make synthetic hydrogen cyanide, chief raw material for acrylic plastics. Current liabilities total $8,999,811. There is $5,600,000 in 3 percent notes outstanding.

Sales in 1947 amounted to $52,842,057 and net income before taxes was $6,541,368. Net after taxes was $3,829,368. In the nine months ended Sept. 30, 1948, sales were $47,060,232 and net after taxes was $3,329,650.

•

Control of two rayon companies, previously exercised by the Office of Alien Property, has gone to Beaunit Mills, Inc. Beaunit's $17,111,126 bid for the government-held shares of North American Rayon Corp. and American Bemberg Corp. was the highest of four bids and has been accepted by OAP. Beaunit gets 125,909 shares of common and 6,175 of preferred stock of Bemberg and 266,251 shares of North American common, a majority holding of shares. The stock acquisition is being financed by Beaunit through loans already negotiated. OAP made this stipulation: the stock acquired from the government cannot be sold or re-sold to alien or foreign buyers.

Integrated from yarn to finished goods, Beaunit is already a major producer of rayon cloth. It owns Skenandoa Rayon Corp., a viscose yarn producer, and is constructing another viscose yarn plant in Alabama. Addition of the North American and Bemberg plants, both at Elizabethtown, Tenn., will give Beaunit an estimated 10 percent of total U.S. rayon output.

•

New rayon pulp plant may go up in the South. Rayonier, Inc., largest producer of wood cellulose pulp, is negotiating for a pulp plant site in Georgia. Construction may get under way soon. A new mill will incorporate production of new types of pulp now being manufactured experimentally by Rayonier.

The new kinds of wood cellulose are of very low viscosity. This will aid rayon makers through re-

ENGINEERING PROBLEMS IN AGITATION

PART OF A CONTINUING PROGRAM OF ENGINEERING BY MIXING EQUIPMENT CO., FOR THE ADVANCEMENT OF AGITATION

TOP ENTERING
LABORATORY
PORTABLE
SIDE ENTERING

How much should a gear shaft flex between bearings?

.005? .020? .0002?

EXPLANATION: This question applies, of course, to precision speed reducers used for agitator drives. As you know, agitator service is probably the only service where users try to get away with rigid coupling of the load to the reducer. In all other services, manufacturers insist on connecting the load by means of a flexible coupling. The illustration above shows in an exaggerated form what happens when the load is direct connected.

Gear shaft deflection of more than .0005 will shorten the life of the reducer. The larger the deflection the more serious the effect. It may also cause early failure of both lower bearings and gears.

COMPROMISE ANSWERS: Three very poor compromises can be made: (1) leave the bearing spacing the same and beef up the lower bearing to stand the gaff; (2) increase the bearing spacing by means of an extension or steeple, keeping the gear below the point of maximum flexure; (3) add another bearing below the reducer. The fact that these modifications are made on reducers of reliable manufacture emphasizes the need for a rugged agitator drive, without expensive stop-gap modification.

Such modifications increase the investment in the reducer alone and step up the consequent shut-down and loss when the reducer fails or parts are required. The occasional satisfactory use of such design, accruing from a happy combination of light duty, flexible agitator shaft, etc., cannot justify their general applications in the face of proven engineering practice: ***"Connect a speed reducer to the load with a flexible coupling."***

NEW W SERIES

SOLUTION: Mixco solves this problem with a low head room, shock proof coupling and simple reducer design. Complete details cannot be given in this limited space, but you can get them in Bulletin B-78. Send for your copy. It's good "reducer insurance" against shut-downs.

If you would like to have some phase of agitation similarly discussed, write us your suggestion. You will receive a personal reply. Write us also about your regular requirements in fluid agitation. Our wealth of background and experience gets results for you.

With Independent Bearings for the Agitator Shaft

SERIES W
1 to 50 H.P.
For open and closed tanks

Name _____
Title _____
Company _____
Address _____

Please send me the literature checked.

- ☐ B-66 and B-76 Side Entering Mixers
- ☐ B-78 Permanently Mounted Mixers for Pressure Vessels and Open Tanks
- ☐ B-75—Portable Mixers (Electric and Air Driven)
- ☐ B-77—Laboratory Mixers
- ☐ Mi-11—Operating Data Sheet

Mixing Equipment Co., Inc., 1028B Garson Ave., Rochester 9, N. Y.

MIXING EQUIPMENT CO., INC. · 1028B Garson Ave., Rochester 9, N. Y.

ducing aging time in yarn production. Whether Rayonier will consume hardwoods in its plant, as planned by International Paper Co. in its projected new southern mill, has not been decided.

International Paper plans to build its plant near Natchez, Miss., if citizens of that community approve a $300,000 bond issue. Output of new pulp mills in Georgia and Mississippi when available will be consumed by the growing rayon industry.

•

Severance tax on minerals mined in Florida is contemplated by Fuller Warren, the new governor. If a general severance tax, affecting all products taken from the earth, were enacted, it would yield as high as $20 million a year. This would include levies on Florida's booming phosphate mining and possibly taxes on Fuller's earth and lime rock. Texas already has a severance tax on sulphur. Florida may well follow suit with a tax on phosphate rock.

•

Du Pont's new plant in Texas is to be built near the town of Victoria. The plant is to produce nylon salt. But here is the interesting new angle: the nylon salt will be made by a radically new synthesis from butadiene.

•

Into production of sodium metal, sodium hydride and chlorine goes National Distillers, broadening its base of operations. National Distillers has picked up an option on a 55-acre tract at Ashtabula, Ohio. This is the same site that Du Pont was considering a year ago (see *Chementator*, Jan. 1948, p. 75). Du Pont dropped its option on this land in April 1948. A wholly owned subsidiary of National Distillers will build and operate a $10 million plant. National Distillers will get licenses on the Du Pont manufacturing processes, as well as technical help from Du Pont. Thus National Distillers, already experienced in chemicals, further diversifies.

•

Pentaerythritol production may be undertaken by another chemical company if there is a big enough industrial demand. In 1949 Celanese will probably start commercial production of pentaerythritol. Pentaerythritol is used instead of glycerine in making alkyd resins for the protective coatings industry. The chemical has a big part in long-range plans of Celanese. Since both of the raw materials for its production, formaldehyde and acetaldehyde, are made at the Celanese plant near Corpus Christi, pentaerythritol could be synthesized in volume.

Alcohol price war is on in earnest. Within five weeks the price of ethanol has dropped nearly 30c. a gal. to a base price of 46½c a gal. in tank car quantities. In some quarters alcohol is even selling from 1½c. to 2c. a gal. under the quoted price. Before the break is halted, the price may fall below 30c. a gal. The leveling-off point may be between 35c. and 40c. a gal. or a little higher. Producers hope it will be above 40c. a gal. But it may take another month or two for the price to stabilize. Competition between synthetic ethanol from ethylene and fermentation alcohol touched off the price war.

While waiting for the price of alcohol to stabilize, fermentation alcohol producers may hold off their purchases of molasses from Cuba until May. Molasses from Louisiana, Mexico, Haiti and other Caribbean sources will tide them over until then. Cuba's 1949 molasses production is estimated at from 250 million to 275 million gallons plus 10 million gallons from refined sugar. Requirements of U.S. fermentation alcohol producers are estimated at 20 million gallons a month for 1949. How much molasses U.S. alcohol producers buy from Cuba's 1949 crop will depend on the final U.S. alcohol price.

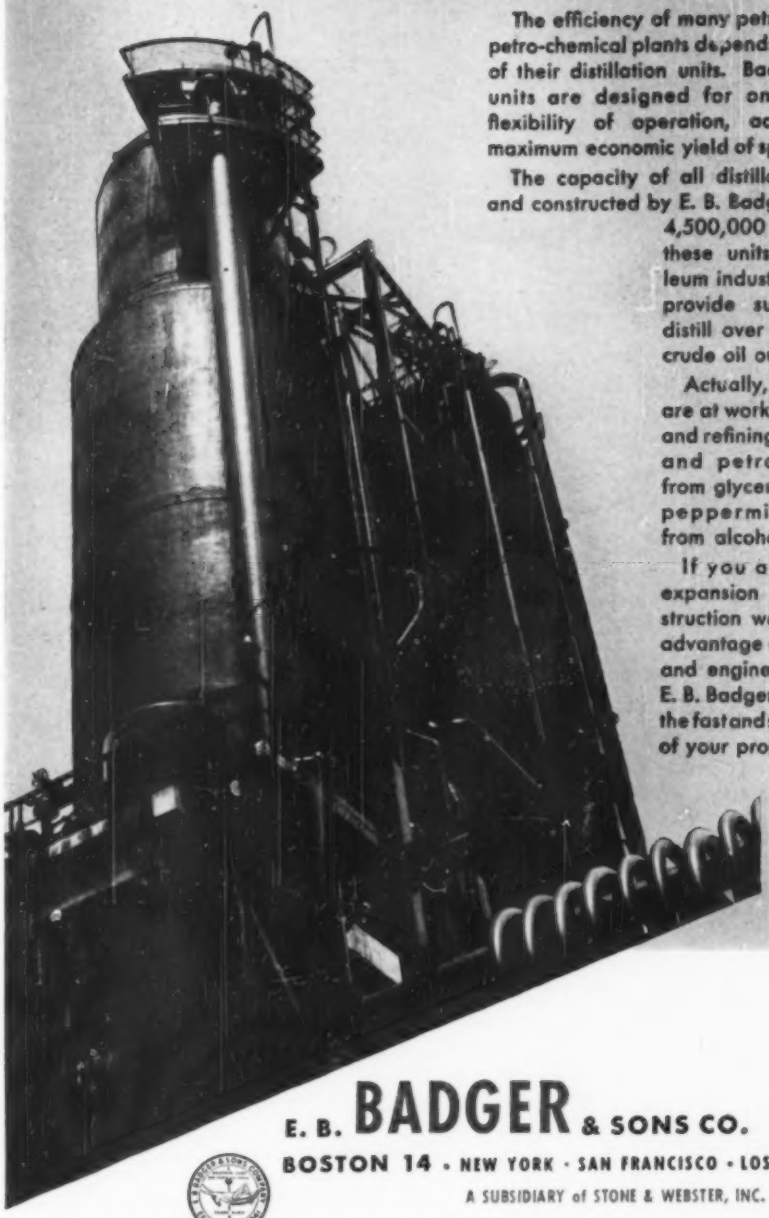
What happens to prices of competing solvents like isopropyl alcohol and methanol will influence demand for ethyl alcohol. Currently, methanol in tank cars is around 28c. a lb. and isopropyl, 41c. a lb. During the period of high ethyl alcohol prices many consumers turned to these other solvents. So if the price of ethyl alcohol stabilizes well below previous high levels, demand for it should become much greater.

Consumption might jump to a point where even the large production of synthetic ethanol might not be able to fill its share of total requirements. To keep pace with growing demand, synthetic makers might require new plants built at high construction costs. These costs might be difficult for the companies to amortize.

•

Cellulose nitrate plastics are on the way out. Celanese, for example, is discontinuing production of all cellulose nitrate plastic products. From now on, Celanese will concentrate on cellulose acetate, cellulose propionate and other new plastics now being developed. Now holding first place among thermoplastic molding compounds is the less flammable cellulose acetate. Since 1931, when it accounted for more than 90 percent of total cellulosics output, production of cellulose nitrate has declined until in 1947 it accounted for only 13 percent. Advent of cellulose acetate sheeting, as well as other technological ad-

A FUNDAMENTAL COMPONENT...



The efficiency of many petroleum, chemical and petro-chemical plants depends on the performance of their distillation units. Badger-built distillation units are designed for on-stream efficiency, flexibility of operation, accurate control and maximum economic yield of specification products.

The capacity of all distillation units designed and constructed by E. B. Badger & Sons Co. totals 4,500,000 barrels a day. If all these units were in the petroleum industry alone, they would provide sufficient capacity to distill over 80% of the national crude oil output.

Actually, of course, these units are at work distilling, separating and refining all sorts of chemical and petroleum products — from glycerin to gasoline, from peppermint oil to phenol, from alcohol to asphalt.

If you are planning plant expansion or new plant construction we invite you to take advantage of the broad process and engineering experience of E. B. Badger & Sons Co. to assure the fast and successful completion of your project.

E. B. BADGER & SONS CO. Est. 1841

BOSTON 14 • NEW YORK • SAN FRANCISCO • LOS ANGELES • LONDON

A SUBSIDIARY of STONE & WEBSTER, INC.

PROCESS ENGINEERS AND CONSTRUCTORS FOR THE CHEMICAL, PETROLEUM AND PETRO-CHEMICAL INDUSTRIES

vances in cellulose acetate, cellulose propionate and other new plastic materials, has hastened the downfall of cellulose nitrate.

•

Tonnage oxygen plant erected by the Bureau of Mines at its coal gasification plant in Louisiana, Mo., is about ready to go into operation. The plant, a modern Linde-Fränkl unit, had been used originally by I.G. Farben in the synthesis of acetic acid and other chemicals at Hoechst, Germany. It was dismantled and shipped to the U.S. It extracts from the air 23,000 cu. ft. of 98 percent oxygen an hour. (Bureau of Mines has also erected a 50,000-cu.-ft. storage tank at its Louisiana installation.) Unlike other Linde-Fränkl units, this one has an auxiliary column for production of pure nitrogen. Linde-Fränkl units differ from standard oxygen plants in their use of regenerative exchangers instead of continuous-flow recuperative exchangers. (Regenerative exchangers are steel vessels packed with aluminum strips that alternately absorb and give up heat.) The Bureau hopes to produce tonnage oxygen at a low cost with its Linde-Fränkl unit.

Here is how the unit gets oxygen from the air. Incoming air is chilled to—300 deg. F. as it flows past aluminum packing in one pair of regenerators. At the same time, in another pair of regenerators, outgoing oxygen and nitrogen cool aluminum packing for the next cycle. Frost and dry ice on cooling surfaces are swept away by the oxygen and nitrogen streams. These regenerative exchangers eliminate the need for chemical removal of moisture and carbon dioxide.

Coal gasification at the Bureau of Mines plant first involves crushing, pulverizing and drying the coal. Next the pulverized coal is fed into a reactor, together with oxygen and steam or carbon dioxide. At high temperatures the mixture reacts to form carbon monoxide and hydrogen, the synthesis gas required in the Fischer-Tropsch process. It also gives a source of hydrogen for coal hydrogenation to produce synthetic liquid fuels.

•

Its portfolio of patents is offered by the Northern Regional Research Laboratory of the U.S. Department of Agriculture for royalty-free licensing. These patents cover processes that have been carried through the pilot-plant stage by researchers at Peoria. Put to work, these processes will mean wider industrial use of agricultural materials. Some of the processes covered by recent patents: (1) starch conversion by the fungal amylase method; (2) saccharification of cellulose material to produce dextrose and pentoses; (3) production of riboflavin; and (4) the "no-distillation" method of extracting oilseeds with ethanol.

•

Packaged solvent extraction units are going to work some changes in the soybean industry. Using trichlorethylene, which does not burn or explode, as solvent, these packaged extraction units are designed to be set up in the soybean producing area. To farmers bringing soybeans, oil meal for feed will be returned at a big saving in freight costs.

To Iowa State's Dr. O. R. Sweeney and Dr. L. K. Arnold goes credit for developing the process and designing the plant. And when Iowa State College Foundation, owner of the patents, granted exclusive rights to manufacture the prefabricated units to Crown Iron Works of Minneapolis, it put that company in the solvent extraction equipment business.

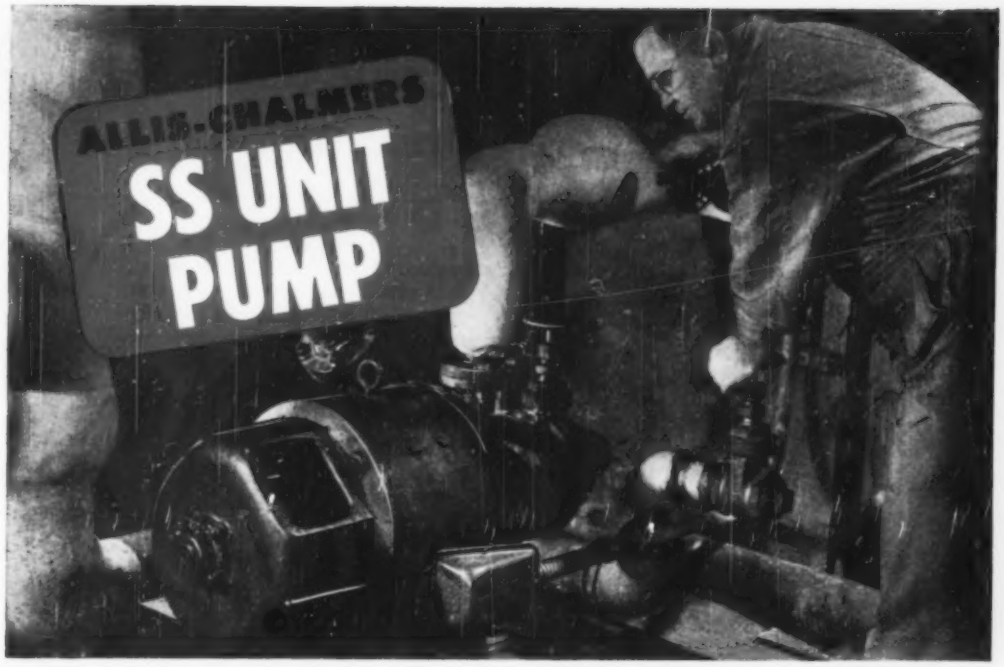
Du Pont is not missing any bets on what looks like a ripe trichlorethylene market. Du Pont men are out in Minneapolis, helping to test the new soybean extraction process. When non-explosive and non-flammable trichlorethylene is used as solvent, no skilled technicians are needed to run the plant. With expensive safeguards eliminated, it costs less to construct a plant that uses a non-explosive solvent. And such a plant is a cinch to get lower insurance rates for fire, explosion and liability.

In the test plant that Crown Iron Works has been running, a bushel of soybeans yields about 11 lb. of oil and about 46 lb. of solvent-free oil meal, high in protein and with less than 1 percent oil. The packaged plant to be marketed is designed and engineered for efficiency and a minimum of labor in its operation. It can be erected in units, each able to turn out 25 tons a day. These automatic units can be assembled on one floor.

Prefabricated units will come ready to set up on locations in the heart of the oilseed crop area. A single unit might be erected at a country elevator or in a mill district where soybeans are grown and farmers need the oil meal for feed. For each bushel of soybeans he brought to an elevator having an oil extraction plant, a farmer would get about 46 lb. of oil meal. Farmers need this high-protein feed. Right now, they pay to have it shipped to them.

•

Fluorocarbon lubricants are being developed. One of the big chemical companies is experimenting with a new lubricating oil. It consists of solid particles of a fluorine-containing polymer in a high-molecular-weight fluorocarbon carrier. Watch for the advent of these new lubricants; they have exciting possibilities.



50% MORE WATER
33% LESS POWER

"Our *old* displacement pump required 15 hp motor to raise 100 gpm 110 ft to roof tanks. *Now* this A-C SS Unit Pump Lifts 150 gpm to same tanks with only a 10 hp motor!"

THAT'S THE EXPERIENCE, along with worthwhile savings in space and maintenance, reported by the chief engineer of a large commercial building.

It is the kind of saving that you, too, may be able to make with Allis-Chalmers SS Unit Pumps. Here are 4 reasons why:—

Deliver Rated Efficiencies — Every unit tested at the factory and the performance curve plotted. Efficiency is proved.

Heavy Construction — Compare section thicknesses, shaft diameters and other features. See why SS Unit Pumps run years without repairs.

Easy Maintenance — Compact design and few parts reduce maintenance. Bronze ring protects casing from wear. Is easily replaced when required.

Application Engineering — When a pump is recommended by an A-C Pump Application Engineer, you know that you are getting the pump that fits your needs exactly and that will give you dependable service at low cost per gallon.

SS Unit is one of many Allis-Chalmers models for most industrial pumping services. For information, see your Allis-Chalmers Authorized Dealer or District Office. Or write for Bulletin 52B6059E. Also listed in Sweet's. A 2595

SS Unit, Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS, 1147A SO. 70 ST.
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS

ASK STOKES

Dry in SECONDS with Stokes Drum Dryers

TEN seconds more or less . . . 10 degrees higher or lower . . . are often the difference between success and failure in a chemical drying process.

The continuous drying of slurries and solutions of heat-sensitive materials is often feasible and profitable only when accomplished in *seconds* . . . and there is no better way to dry many such materials than by drum drying.

Stokes drum dryers are "application-designed" to fit the precise needs of your product. Moisture content, consistency, heat sensitivity, required production rate, and all other factors are carefully analyzed before a recommendation is made.

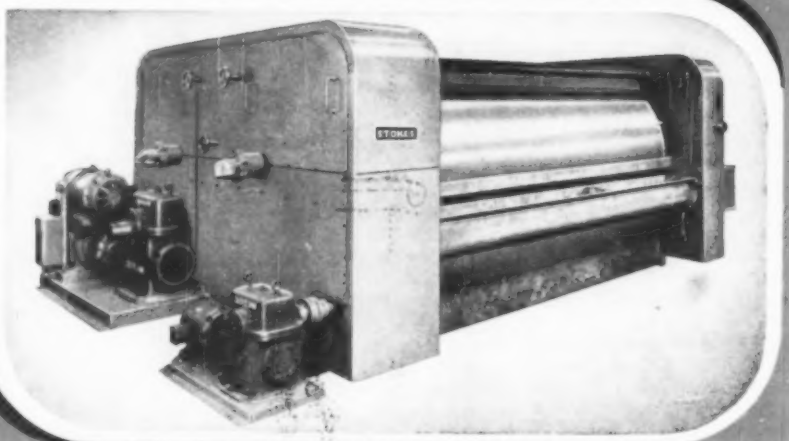
. . . and you can test the procedure in the Stokes semi-plant-scale laboratory.

If you have any problem in drying, it may be worth while to let Stokes work with you.

F. J. Stokes Machine Company, 5920 Tabor Rd., Phila. 20, Pa.

FJS

Stokes makes Vacuum and Special Processing equipment, High Vacuum Pumps and Gages, Pharmaceutical equipment, Industrial Tabletting and Powder Metal Presses, Plastics Molding Presses, Water Stills and Special Machinery.



This double drum unit is one of many sizes and types of drum dryers built by Stokes for the processing industries.

STOKES KNOWS HOW

This Air Compressor CAN'T BLOW UP...

It's Equipped with a BS&B SAFETY HEAD

The Black, Sivalls & Bryson SAFETY HEAD, containing a rupture disc which bursts at a predetermined pressure, stands sleepless guard over this air pressure system. Whenever overheating, mechanical failure or a faulty control causes a suddenly mounting *over pressure*—a relief valve may not react to it, but the BS&B SAFETY HEAD does! Before the critical point, it bursts . . . and disaster is averted! Investigate this inexpensive protection for *your* property now. Write today to Special Products Division, Black, Sivalls & Bryson, Inc., Power & Light Building, Kansas City 6, Missouri.

Hold-down flange of bolted type SAFETY HEAD assembly—furnished with threaded, welded or flat outlet.

Rupture disc—bursts at a predetermined pressure—guaranteed when sold to burst within 5% of specified pressure.

Base flange, bolted type. BS&B SAFETY HEAD flanges can be made to order to suit special conditions. Available with bursting pressures from 5 lbs. to 30,000 lbs.

EFFICIENCY RELIABILITY

FOREIGN INQUIRIES INVITED Cable Address: BLACK, KANSAS CITY, U.S.A.

BLACK, SIVALLS & BRYSON, INC.

KANSAS CITY, MO. OKLAHOMA CITY, OKLA.

K&M "*Century*" Asbestos Corrugated

for long life without maintenance...

The "new" roof on this industrial building is actually more than 3 decades old! A coal operator installed these "Century" Asbestos Corrugated sheets on a coal tipple 33 years ago before he re-used them here.

for modern architectural effect...

Beauty in typically modern style is brought to this store with a facade of "Century" Asbestos Corrugated. This beauty will last without any painting or other expensive upkeep.

You've probably noticed that "Century" Asbestos Corrugated is growing in popularity for decorative motifs... inside and outside... for industrial plants, stores, restaurants, theaters. There's a rugged attractiveness in the simplicity of the corrugations and neutral light-gray coloring.

And perhaps it's no news to you that "Century" Asbestos Corrugated is thoroughly practical from the *structural* point of view. It actually *toughens* with age. Never needs to be painted. Can't rot, corrode, catch fire, or succumb to termites.

NEW "TOP-SIDE" FASTENERS CUT ROOFING COSTS

On top of all this, you can specify the new "TOP-SIDE" Fasteners, and cut a big slice off the cost of roof installation over steel purlin construction. Exclusive with "Century" Asbestos Corrugated, these new fasteners permit roofing to be done entirely from *atop the roof* ...eliminating entirely the costly labor and scaffolding normally required beneath. This feature, alone, is worth looking into—write us for full details.

Nature made Asbestos... Keasbey & Mattison has made it serve mankind since 1873

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M best in asbestos

WATER SPOTS caused by humidity, in the varnishing of rubber footwear, may be eliminated through the use of small percentages of AEROSOL OT in the varnish.

QUICKER DOUSING of fires in materials difficult to wet, such as bales of cotton or mattresses, is achieved with the aid of AEROSOL Wetting Agents.

Shorten processing time and improve product performance with AEROSOL* WETTING AGENTS

If you have processes or products in which fast wetting action is essential, specify AEROSOL Wetting Agents, the most powerful available.

You will find them remarkably effective in bringing about intimate contact when added to water, oils or surface coatings. They may be used to increase spreading action . . . aid penetration . . . regulate characteristics of precipitates . . . increase reaction rates between immiscible liquids . . . and perform other tasks quickly and at low cost.

The illustrations here merely indicate some of the many fields in which these products have found uses. These may suggest other applications in *your* business where they can be employed profitably. AEROSOL Wetting Agents are available in a number of types to meet the wide variety of requirements.

*Reg. U. S. Pat. Off.

Descriptive, detailed booklet will be sent on request.

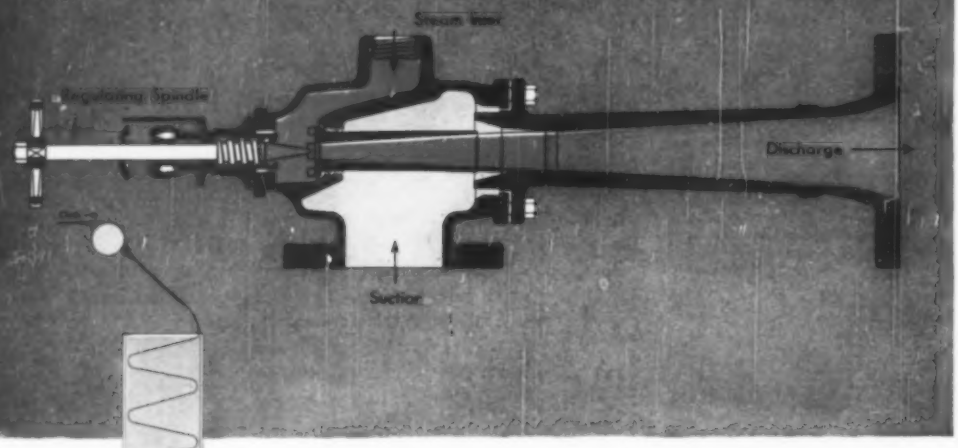
METAL SURFACES, including silverware, are more rapidly and efficiently cleaned with metal polishes containing AEROSOL Wetting Agents.

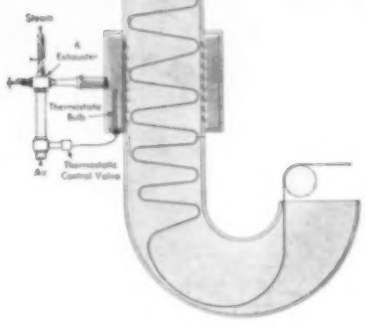
SPEED UP of bottle washing in bottling plants is now being effected with AEROSOL Wetting Agents used in conjunction with the usual caustic soda wash.

AMERICAN Cyanamid COMPANY
INDUSTRIAL CHEMICALS DIVISION, DEPT. L
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Better Check!

an SK exhauster may do it better . . . faster





This application shows an SK Exhauster being used on a textile mill J-Box to mix steam and air, in proportion, for the uniform bleaching of cloth. It is but one of many applications featuring the adaptability of the Jet

If you have a process problem involving pump priming, exhausting, evacuating, cleaning, transporting, compressing or agitating, you might do well to investigate SK Steam Jet Exhausters and Compressors. Because these versatile air and gas pumps are employed universally in such operations where they frequently do the job better, faster and more economically. Using steam or compressed air as the operating medium, they entrain, compress and discharge air or vapors. Compact in design, simple in operation, without moving parts, they are available in bronze, iron, Monel, steel, Everdur, hard lead or Pyrex as conditions necessitate. For complete information on SK Exhausters and their many applications, send for a copy of new Bulletin 4-E.

SCHUTTE and KOERTING Company

Manufacturing Engineers

1190 THOMPSON STREET • PHILADELPHIA 22, PA.

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS AND FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

"Life/cost ratio of superheater coil vastly improved since switching to Sicromo No. 5 steel,"

reports W. C. Hardesty Company

CONTINUOUS operation at 1200° F. was raising hob with the superheater coil at W. C. Hardesty Company, Dover, Ohio. The red hot temperatures were weakening the steel. Too frequent replacements were necessary and valuable hours of production time were being lost.

Learning of the problem, metallurgists of The Timken Roller Bearing Company suggested that the coil be made out of Sicromo No. 5—a special analysis Timken high temperature steel. So while the manufacturer was having a new furnace installed he decided to put in a new Sicromo coil, too. The results were amazing.

Where the grade formerly used had to be replaced every year, the Sicromo tubing stood up under the terrific heat *for seven years* before replacement was necessary. Valuable production time was saved. And less money was spent for tubing—thanks to Timken's ability to specify the high temperature steel that delivers the *best* life/cost ratio for each particular application.

Why not let the metallurgists of the Timken Company analyze *your* high temperature tube problems? With 19 years of experience and research, plus a wide selection of Timken fine alloy steels at their disposal, they can recommend the steel that will do your job most efficiently. No obligation. Write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

Where Pennsylvania coal *becomes* "Pittsburgh" chemicals

Unlocking the chemical treasure house of coal and extracting and recovering its components for the uses of science, industry and commerce is the business of Pittsburgh Coke & Chemical Company.

At its modern, integrated plants on Neville Island, just a few miles down river from Pittsburgh, the bituminous coal from the company's own mines is converted into coke and the many chemicals recovered from the by-product tars and gases.

Here, in addition to ideal facilities for research and production, favorable shipping location and sources of supply combine to assure dependable, uniform quality chemicals. Inquiries about any of the company's chemical products listed below are invited.

"PITTSBURGH" CHEMICALS

- Activated Carbon
- Alkyl Methyl Pyridinium Chloride
- Alpha Naphthylthiourea
- Alphanitronaphthalene
- Benzol—Motor, Nitration, Pure
- Creosote
- Cresol—Meta Para, Ortho
- 2, 4-Dichlorophenoxyacetic Acid
- Dinitro-Orthocresol
- Isopropyl N-Phenyl Carbamate
- Naphtha, Heavy Solvent
- Naphthalene
- Para Amino Phenyl Mercuric Acetate
- Phenol
- Phthalic Anhydride
- Picoline—Alpha, Beta and Gamma
- Pipe Line Enamel
- Pyridine—Medicinal and Industrial
- Sodium Cyanide
- Sodium Thiocyanate
- Sulphate of Ammonia
- Sulphuric Acid—60°, 66° and Oleum
- Tar Acid Oil Disinfectants
- Tar—Crude and Road
- Toluol—Nitration and Commercial
- Xylol—10°, 5° and 3°

P C&C C

Pittsburgh Coke & Chemical Company

Grant Building · Pittsburgh 19, Pennsylvania

AUTOMATIC CONTROL EQUIPMENT

ENGINEERED DESIGN BY **HAMMEL-DAHL**

The "Dahl-Seal"®

Eliminates Packing Box Problems on High Pressure Control Valves

Patent Pending

ANOTHER Hammel-Dahl FIRST

The "Dahl-Seal" provides a frictionless, leak-proof Valve stem, regardless of the static pressure in the system.

1. The valve stem can be positioned to an accuracy of 0.001" in high pressure valves at operating pressures up to 15,000 psi.
2. Eliminates conventional packing box leakage.
3. No periodic take-up or adjustment is necessary.
4. Seals by force of system pressure.
5. Negligible stem friction at any pressure
6. Completely resistant to chemical attack.
7. Can be used for any temperature for which the valve is designed.
8. Available for any Hammel-Dahl Valve, including those now in service.

Hammel-Dahl manufactures High Pressure Control Valves for operating pressures up to 15,000 PSI.

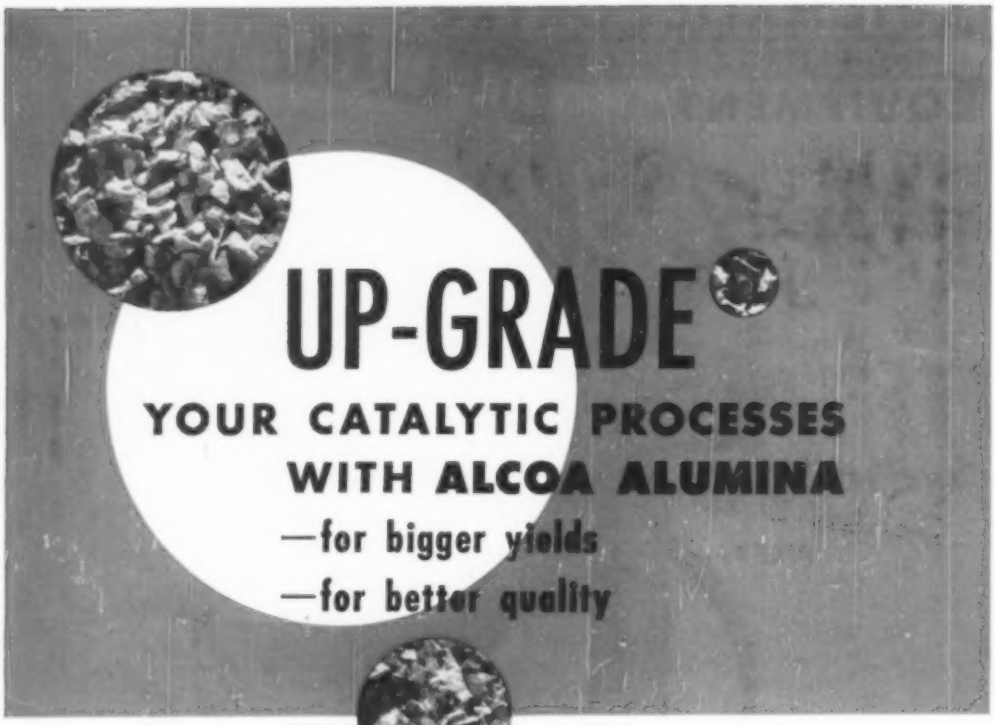
The Valve illustrated is the Hammel-Dahl ¾" Type 7735ST High Pressure Valve with Dahl-Seal. Pressure rated at 22,500 PSI.

HAMMEL-DAHL COMPANY

243 RICHMOND STREET, PROVIDENCE 3, R. I., U.S.A.

ALBANY, BOSTON, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, DENVER, DETROIT, HOUSTON, KINGSPORT, TENN., LOS ANGELES, NEW YORK, OAKLAND, PITTSBURGH, ST. LOUIS, SEATTLE, TULSA, WILMINGTON, DEL.

In Canada, Railway & Power Engineering Corporation, Ltd.



If you want to up-grade your catalytic process yields, or simply reduce losses from contamination and side reactions, you'll find it advantageous to insist on ALCOA Aluminas for your Al_2O_3 catalysts and catalyst supports.

ALCOA Aluminas are uniform in structure and chemical purity . . . stable at elevated temperatures . . . have high resistance to erosion and crushing . . . and are moderate in cost. Typical conversions for which ALCOA Aluminas are used include: *Aliphatic hydrocarbons into aromatics, and dehydrogenation of naphthenic hydrocarbons.*

★ **ALCOA *Activated* Alumina is preferred for many reactions because of its high adsorptive properties and extremely large surface area.**

★ **ALCOA *Tabular* and other forms of Alumina are preferred for certain reactions where hardness and extremely high purity are relatively more important than maximum surface area.**

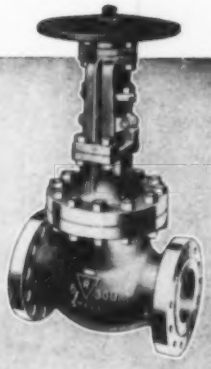
For top quality, specify ALCOA Aluminas for catalysts and catalyst supports. You'll get more efficient, uniform reactions and end-products of higher purity. We'll gladly send you samples and further information.

ALUMINUM COMPANY OF AMERICA,
CHEMICALS DIVISION, 1778
Gulf Building,
Pittsburgh 19,
Pennsylvania

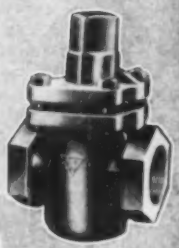
ALCOA CHEMICALS
ALUMINAS AND FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • LOW SODA ALUMINAS • TABULAR ALUMINAS • HYDRATED ALUMINAS
ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE

"VALVE MEN" LIKE R-P&C VALVES

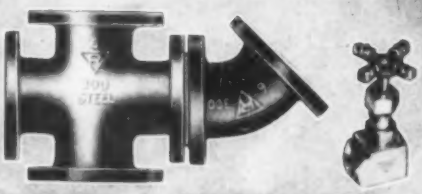


Men who really know valves—know where to look for those details of design and construction that insure top performance—have a lot of respect for Reading-Pratt & Cady.



An R-P & C valve must be more than just an assembly of machined parts. It has work to do. R-P & C feels the responsibility for that work being done faithfully.

Consider your R-P & C distributor as your "valve man"—a responsible source for bronze, iron and steel gate, globe, angle and check valves—Bar Stock valves—iron cocks—Lubrotite gate valves—cast steel fittings.



ACCO Reading, Pa. • Atlanta • Baltimore • Boston • Chicago • Denver • Detroit • Houston
New York • Philadelphia • Pittsburgh • San Francisco • Bridgeport, Conn.

READING-PRATT & CADY DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

READING-PRATT & CADY

TIME SAVED in Layout . . . TIME SAVED
Because Pipe Can be Cut in Advance . . .
TIME SAVED Lining Up and Fitting . . . .
TIME SAVED in Welding . . . . . by the
EXCEPTIONAL DIMENSIONAL
ACCURACY of MIDWEST
Welding Fittings
ASA TYPE
MIDWEST "LONG TANGENT"
SIZES 2" to 12"
90° ELBOWS
REDUCING ELBOWS
LATERALS
CROSSES
REDUCING-ON RUN TEES
ASA TYPE
MIDWEST "LONG TANGENT"
45° ELBOWS
180° RETURNS
TEES
SLEEVES
SHAPED NIPPLES
CAPS
MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGNS

Many large users of pipe welding fittings report that Midwest Welding Fittings save them important time . . . and money . . . because of their unusual accuracy to published dimensions and their exceptional uniformity. These advantages did not just happen . . . they are direct results of the unique Midwest manufacturing methods.

But savings in time and cost are not the only advantages offered by Midwest Welding Fittings. Simplified and improved piping design is also often possible. For example: the Midwest Reducing Elbow (available in sizes through 12") decreases pressure drop and turbulence when used instead of a standard elbow and reducer (it also saves more than ⅓ of the welding). Midwest Long Tangent Elbow removes weld from point of maximum bending stress and is designed to permit use of slip-on flanges. Midwest Saddles compensate for weakening of header body resulting from metal removal for nozzle opening. Midwest Sleeves relieve butt welds of bending and tensile stress. There is a distributor near you . . . it will pay you well to call on him for your welding fitting requirements.

MIDWEST PIPING & SUPPLY CO., Inc.

Main Offices: 1430 South Second Street, St. Louis (4), Mo.
Sales Offices: New York (7), 30 Church St.
Chicago (3), 79 West Monroe St. • Los Angeles (33), 520 Anderson St. • Houston (2), 229 Shell Bldg. • Tulsa (3), 533 Mayo Bldg. South Boston (27), 426 First St. • Distributors in Principal Cities.

MIDWEST PIPING SERVICE IS NATION-WIDE

4 PLANTS ARE BETTER THAN 1

LAP-JOINT STUB ENDS

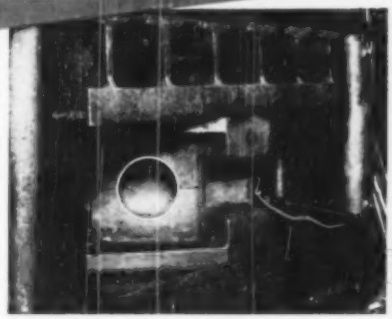
REDUCERS

FLANGES

SADDLES

AND REDUCE COSTS . . .

Here's Why TIME IS SAVED

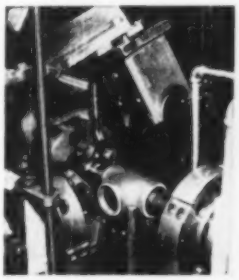


SIZING IN COMPRESSION

Midwest Elbows are first made slightly oversize. They are then reheated to forging temperature and brought to final size in compression dies. In addition to relieving forming and welding stress, this assures true circular cross section, uniform wall thickness and accurate radius, included arc and tangents.

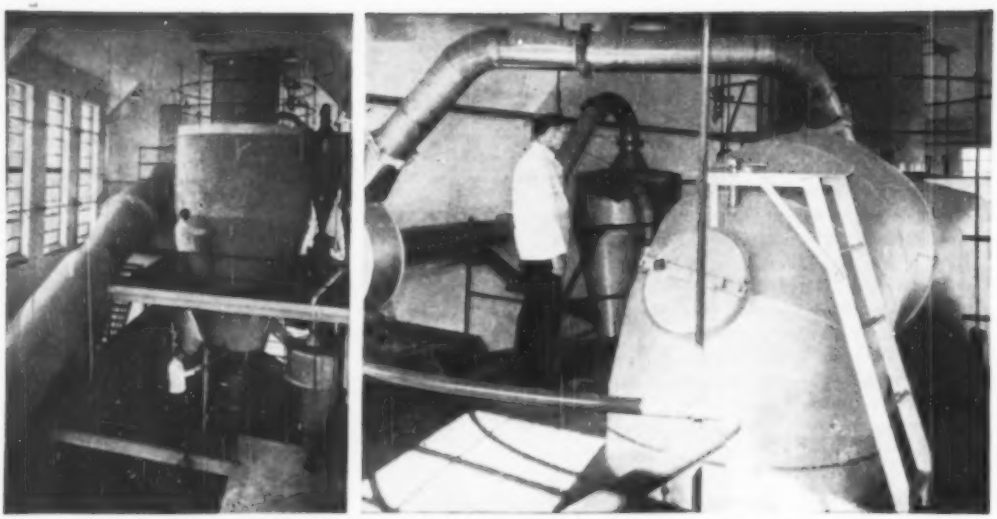
SPECIAL MACHINING

Special machines developed by Midwest simultaneously bevel the ends of Midwest Welding Fittings. This assures exact included angles and holds center-to-end dimensions well within tolerance specifications.

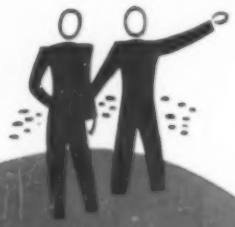


FINAL INSPECTION

Every Midwest Welding Fitting is individually checked to insure that the high standards of precision are maintained.



Two interior views of the Swenson Spray Dryer Research Laboratory



Do you know about the latest developments in SPRAY DRYING?

Spray drying is making important advances as a result of research conducted in the Swenson Spray Dryer Research Laboratory.

Plant-scale tests—conducted almost daily—are revealing important engineering information which is being incorporated in Swenson Spray Dryers to increase operating efficiency and improve product quality.

As a result of these refinements, recent installations are surpassing the remarkable records made by a similar equipment over a period of years—records that established spray drying as the pre-eminent method of producing high-quality dried dairy products.

There is no substitute for Swenson "know-how" and experience. If you contemplate spray drying your products, it will pay you to consult Swenson.

SWENSON EVAPORATOR CO.
DIVISION OF WHITING CORPORATION
15669 Lathrop Avenue Harvey, Illinois
Export Department: 30 Church Street, New York 7, N. Y
In Canada: Whiting Corporation (Canada) Ltd., 45 Richmond St. West, Toronto

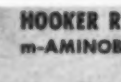
Hooker Acid Chlorides

MEET A WIDE RANGE OF NEEDS

The Hooker Chemicals described below are all acid chlorides. Their properties make them of use in such varied fields as the manufacture of dyestuffs, plasticizers, pharmaceuticals, and lubricants. If you are engaged in any of these fields or in other chemical processing, some of these acid chlorides may make your work easier.

Brief descriptions and some of the uses of these acid chlorides are given below. Technical Data Sheets and samples will be furnished when requested on your letterhead. For more information consult our Technical Staff for help on how Hooker Chemicals may solve your specific problems.

HOOKER RESEARCH PRESENTS
m-AMINOBENZOTRIFLUORIDE



Molecular Weight	161.13
Freezing Point	3° C
Distillation Range	5° including 189° C
Specific Gravity, 15.5°/15.5° C	1.303
Refractive Index, n20/D	1.481

Another new fluoride from Hooker Research Laboratories, m-Aminobenzotrifluoride seems destined for wide use as an intermediate in the preparation of dyestuffs. Preliminary investigations also indicate the possibility of further nuclear substitution. The CF_3 group is usually strongly meta directing. However, in this compound indications are that the NH_2 group will have a greater directing influence than the CF_3 group. Further substitution will very likely be in the position ortho to CF_3 and para to NH_2.

The CF_3 group is chemically stable but in the NH_2 group one or both hydrogens may be substituted.

m-Aminobenzotrifluoride is a colorless liquid with a characteristic aniline like odor. It turns brown when exposed to light. At present it is available in pilot plant quantities. Technical Date Sheet 306 describes its physical and chemical characteristics fully and gives literature references. When requesting literature or samples, please use company letterhead.

PRODUCT *Chemical Formula and Molecular Weight*	DESCRIPTION AND USES
METANITROBENZOYL CHLORIDE $NO_2C_6H_4COCl$;185.5	Yellow to brown liquid partially crystallized at room temperature. Last crystal point 28° to 31° C. Manufacture of dyes for fabrics and color photography; intermediate in preparation of pharmaceuticals.
PARANITROBENZOYL CHLORIDE $NO_2C_6H_4COCl$;185.5	Yellow crystalline solid. M.P. 70° C minimum. Manufacture of novocaine, procaine hydrochloride; dyestuffs.
ACETYL CHLORIDE CH_3COCl;78.5	Clear, colorless to pale yellow liquid. Dist. R. 2.5° incl. 51° C. To introduce acetyl group into organic compounds. Manufacture of intermediates, dyes, and pharmaceuticals.
BENZOYL CHLORIDE C_6H_5COCl;140.5	Clear, colorless liquid. Boiling point 198° C. As a highly reactive acid chloride, it may be used to introduce the benzoyl group into organic compounds, especially through Friedel-Crafts reactions. It is used in the manufacture of synthetic perfumes, pharmaceuticals, dyes and resins.
PHOSGENE (CARBONYL CHLORIDE) $COCl_2$;98.9	Liquified gas. F. P. — 126° C., B.P. 8.2° C Manufacture alkyl and aryl chlorocarbonates and dialkylcarbonates; Michler's ketone; dye intermediates; metal chlorides and anhydrides; pharmaceuticals; perfumes.
SULFURYL CHLORIDE SO_2Cl_2;135.0	Light yellow liquid. B. R. 2° incl. 69.5° C. Reacts with organic acids to form other chlorides and anhydrides. Chlorinating agent for chlorophenol and other chlorination reactions in organic synthesis.
THIONYL CHLORIDE $SOCl_2$;119.0	Clear, pale yellow to red liquid. B.R., refined grade, 75° to 78° C. Manufacture of organic acid chlorides and anhydrides, alkyl chlorides from corresponding alcohols. It may be used to introduce sulfur alone or in combination with oxygen.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

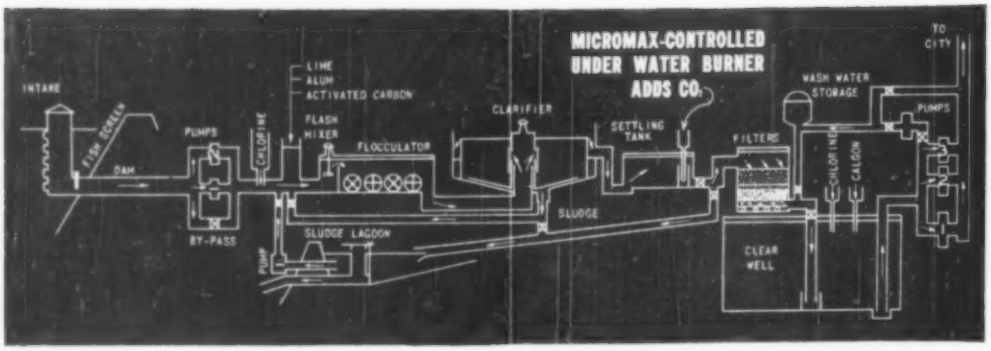
5 UNION ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

HOOKER CHEMICALS

B-1341

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE



Oklahoma City's New Water Plant

Holds Accurate pH by MICROMAX Control

At Oklahoma City's new Lake Hefner filtration plant, fifteen million gallons of lake water per day are carbonated to constant pH value, by means of a Micromax-controlled underwater burner. As can be seen in the plant diagram above, carbonation takes place after flocculation and settling. The process is designed to remove the residual lime softener which has been added in a flash mixer located ahead of the flocculation station.

The carbonator is made by Ozark Chemical Co. Its burner nozzle projects into a settling basin where water has been held for about 30 minutes after passing through the clarifier. A controlled mixture of air and natural gas is fed to the burner at a pressure about one-half a pound per square inch greater than that of the water at the nozzle, and forms a submerged bubble big enough to enable the gas to burn. Carbon dioxide produced by combustion reduces the alkalinity of water to the desired pH value for final filtration.

To maintain pH of treated water at the specified value for economical use by domestic and industrial consumers, a Micromax pH Controller, through its Electric Drive Unit, adjusts the flow of fuel and air to the underwater burner. The Controller's pH detector is an L&N Glass Electrode Assembly through which flows the sample stream of water drawn from a settling basin point just ahead of the carbonation station.

The Micromax pH Control is fully proportioning, and holds specified pH regardless of changes in water flow through the plant. It neither over-treats nor under-treats—always supplies just the proper amount of fuel for correct carbonation.

Master control panel includes Micromax pH Controller for carbonation (center) and Micromax pH Recorders for water after flocculation and water as supplied to city mains.

Two more Micromax instruments on the master control panel record pH of water after flocculation (before clarification) and, as a final check, pH of finished water supplied to the city mains. These instruments help to keep plant operators informed on each phase of the treatment process and are of substantial help in preventing undue pH effect on plant equipment, as well as in actually saving large amounts of treatment chemicals.

The Micromax pH equipments used in this installation are entirely standard. If you have a water-treating problem, an L&N engineer will be glad to discuss it with you. Or, if you prefer, we'll send Bulletin N-96-744A, "Corrective Water Treatment." Leeds & Northrup Company, 4916 Stenton Ave., Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jel. Ad N-96-701(8)

"Give us the tools . . ."

What Are *YOUR* Chances If There Are No Profits?

Since the November 2 election there has been a dazzling variety of plans to have the government do more and more things and spend more and more money. But there is almost no variety in the plans which are suggested to raise the money.

"Pay for it by taxing profits," is the standard refrain. Slap on an "excess" profits tax. Boost the corporations' income tax rate.

Well – why not? Haven't the corporations been making so much money that a big chunk of it can be turned over to the government spenders without hurting anybody?

The answer is no!

How high profits should be can be debated endlessly. Some people claim that 1948 corporation profits, which will amount to about $20 billion, are too high. They emphasize the fact that profits are larger in relation to investment than they were a few years ago. Other people think profits are low. They stress the fact that profits are not much larger in relation to sales than they have been historically. Both sides agree that in some individual cases profits have been too high, as in others they have been too low or non-existent.

But if we cut the total volume of profits drastically, we shall do so at our national peril.

There is no room for debate about that. For we shall choke off the crucially important job of building new plants and equipment for our industries. Squeeze hard enough, and America will go the way of Britain – down the long and painful skids of industrial decline. Widespread unemployment, especially among our industrial workers who produce new plants and equipment, will mark the dreary way. Here is a fact which the President, the Congress, the C.I.O., and all of us have a real reason to remember:

Almost two-thirds of all profits today are going to rebuild and improve plants and equipment.

More than $13 billion of this year's profits are being plowed back. They are going – as a large proportion of profits have always gone – to buy for workers better tools to work with, better surroundings in which to work. They are making possible better products, and more of them, for all of us.

The figures below show how companies have put more and more profit-dollars and a larger share of their profits to work in the business:

YEAR	PROFITS REINVESTED	% OF TOTAL PROFITS
1929	$2.6 billion	31%
1939	1.2 "	24%
1943	5.9 "	57%
1944	5.2 "	53%
1945	4.2 "	47%
1946	6.9 "	55%
1947	11.2 "	62%
1948 est.	13.0 "	65%

continued on next page

The record shows that each of us is the real beneficiary of this plowing back of profits.

Every American has benefited from these profits. Each dollar that business has put into its plants and equipment in the last thirty years has increased our yearly production by 35 cents.

This re-investment of profits has helped make possible a 75% increase in living standards since 1919.

It has helped increase wages from an average 48 cents an hour in 1919 to $1.36 today. Allowing for higher prices, that increase means that an hour's work today will buy twice as much as it did thirty years ago.

Why must business retain these billions of profits to improve its plants and equipment? Why must it plow back more and more? *The reason is that business already is caught in a tax squeeze.*

Federal taxes alone take at least thirty-eight of each one hundred dollars a company earns. Then, if the company pays out to its stockholders any part of what is left as dividends, the federal personal income taxes of the stockholders may take up to 77% of those dividends. Under these conditions, so few people are willing to invest in industry that the stock market is stagnant. Companies can not raise in that market the money they need for improvements.

The result: business must rely more and more on plowed-back profits to pay for new plants and equipment.

We know that everywhere in industry new and better ways of producing goods are standing ready for use. The previous editorial in this series mentioned some of them. We know, too, that depression and war put our industries far behind schedule – as much as $100 billion behind – in getting the new tools they should have had to keep themselves in first-class shape. McGraw-Hill is now completing a survey of industry that will measure these needs. The results will be published in this editorial series. We know already that in 1949 alone industry will need $18 billion or more for this purpose.

And all but a small fraction of that sum must come from profits.

Our prosperity, our strength as a nation, our hopes for better living depend on our continuing to generate and to plow back a large volume of profits.

For that reason we should not thoughtlessly follow these people who propose to pay for any and all new government activities by saying simply, "Soak the corporations." There is no need to follow them. There are other ways of obtaining necessary funds.

First and foremost should be economy within the government itself. If its citizens must pay still higher taxes, then surely government should exercise rigid self-restraint, cutting out all but the most essential activities and expenses.

After economy should come consideration of a broader federal tax base.

If these and other methods of raising money are inadequate and if taxes must take a bigger bite from business profits, two facts are clear. We should not adopt an "excess" profits tax with all of its complications and all of its corrupting effect on business. A moderate increase in the regular income tax on corporations is much less dangerous. *But even such an increase, if necessary, should be accompanied by special allowances for expansion and depreciation that will encourage companies to continue spending their earnings for new plant and equipment.* We all have a stake in that.

At this critical juncture in our history profits have a new and vastly more important role than they have ever had. In unprecedented degree they are the drive behind our present prosperity and the key to a better, stronger future.

Give profits the axe and the blow does not stop there.

It cuts into the employment, the prosperity and the strength of our nation.

Everyone of us has a stake in how the President and Congress handle taxes on profits – and now is the time to remind them of that stake.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

CHEMICAL ENGINEERING
with CHEMICAL & METALLURGICAL ENGINEERING

ESTABLISHED 1902 JANUARY 1949 SIDNEY D. KIRKPATRICK, Editor

Let's Get Off Our High Horses!

THERE was a new note in most of the year-end statements of our business leaders. Somewhat sobered and chastened by trends and events of the past few months, these men are beginning to realize that for many industries the lush days of the boom are about over. From here on the future is going to depend pretty much on what we make of it. In the words of the very vocal president of Allegheny-Ludlum, "It's time to get off your horse and get down to business!" Mr. Batcheller and his hard-working team of executives are doing just that. They've rolled up their sleeves and gone to work on some of the most fundamental problems of their operations—labor and community relations.

What AL accomplished at its plants in West Leechburg, Pa., and Dunkirk, N. Y., is a truly remarkable story which we are privileged to publish in this month's "Men, Machines and Methods." During a two-day open house more than 15,000 people poured through the Pennsylvania plant—despite the fact that the combined population of West Leechburg and Leechburg is under 6,000. At Dunkirk more than 22,000 people saw the plant. The visits were carefully organized to include the entire communities and their environs, not just the workers and their families. The result was a wholesome gain in attitude toward the company, in understanding of its problems and policies. More tangible results can be measured in terms of increased production, with output of some departments upped from 25 to 200 percent.

Encouraged by this progress in community and industrial relations, the company is extending its educational program to include a series of public meetings at each of its plants. Invited are all the so-called "thought leaders" of the community—the clergy, merchants, doctors, and, of course, the local union leaders. The purpose is to tell these people just what the plant is doing to make their community a better place to live in and what in turn the community can do for the company and its employees. The job is not turned over to someone from the public relations department in Pittsburgh. It is done by the top executives of the company.

When we asked Mr. Batcheller what all this cost in terms of time and money, he answered, a bit impatiently, "It's not what public education costs us today, it's what we'll have to pay tomorrow if we neglect it." That attitude and determination are certain to pay off as times get tighter and problems more difficult.

GOVERNMENT, too, faces the necessity for getting down to business. The new administration's honeymoon is about over. There are hosts of wasteful practices that have been carried over from wartime operations. The Hoover Commission on Reorganization of the Executive Branch of the Government has shown that $250,000,000 could be saved annually in the buying of supplies. Needless red tape and paper work often cost more than the materials themselves. The whole emphasis is not on promoting efficiency and economy, but on preventing fraud. As a result, there is failure all along the line.

INDUSTRY-COMMUNITY relations and government purchasing may seem to have little in common. Yet if both are wasteful and inefficient, there is a drain on the national economy that penalizes all of us. Industry and government can each do their part in making 1949 a better year for business. But it's time we all followed the steelman's advice, got off our high horses and down to work—in our own backyards.

McCarthy Chemical Co. plant is shown in the left foreground. In extreme left foreground, in front of row of horizontal cylindrical storage tanks, is the oxygen unit. In left background, beyond string of tank cars, is the absorption plant where natural gas is stripped of its heavier components. The stripped gas is charge stock for the chemical plant.

Organics From Natural Gas

CHEMICAL ENGINEERING PICTURED FLOWSHEET ON PAGE 132

McCarthy Chemical Co. joins the trend toward increasing uses for natural gas and now produces methanol, formaldehyde and acetaldehyde by controlled oxidation of natural gas from which the heavier hydrocarbons have been stripped.

In the center are some of the storage and blending tanks for formaldehyde. In the rear, the fractionating system for separation of formaldehyde, acetaldehyde and methanol, consists of the customary low-pressure bubble cap towers.

J. V. Hightower

Southwestern Editor
Chemical Engineering

ORGANIZED in 1946, McCarthy Chemical Co., subsidiary of McCarthy Oil and Gas Corp., Houston, Tex., has begun to manufacture methanol, formaldehyde and acetaldehyde by oxidation of natural gas components near the Gulf Coast town of Winnie, 60 mi. east of Houston. Officials of the company regard this as the beginning of a program to produce other petrochemicals such as ethylene and aromatic compounds based on large resources of natural and casinghead gas available in the area.

The chemical venture is the second and logical phase in the entry of the McCarthy organization into the petrochemicals field now expanding over the coastal region. Late in 1945 a branch of the organization, Absorption Plant, Inc., completed at Winnie the first phase, a natural gasoline absorption plant having a capacity of 100 million cubic feet of gas per 24 hr. This unit is producing propane, butanes, a mixture of the two, motor gasoline, kerosene and fuel oil. A larger volume of gas will be processed in a few months when a second absorption unit now under construction is completed.

The project at Winnie typifies the evolution, over recent years, of natural gas from a fuel to natural gas not only as a fuel but also as one of the major sources of gasoline and chemicals. Much of the gas produced earlier on the Gulf Coast was, if used at all, burned as fuel, with or without reclamation of its gasoline content before burning. Enormous quantities of gas produced in conjunction with crude petroleum were, for lack of profitable outlets, "flared" or ignited and allowed to burn without any recovery of the heat.

Operations at Winnie exemplify the close of that era in an increasing number of localities where little if any gas is wasted. In addition to its natural gasoline absorption plants the company put into operation last summer a catalytic reforming unit for producing premium grade gasoline from gasoline components of relatively low octane number. This is a 3,500 bbl. per day unit operating on components obtained from the existing absorption plant. The chemical company now carries the utilization of gas one step farther.

There are no present plans for manufacturing and marketing any derivatives of the three intermediates being produced. The company policy is to manufacture intermediates for processing by other companies. The two gasoline plants and the reforming unit are potential sources of raw materials for additional intermediates that may be manufactured in the future.

Rated maximum amount of feed gas handled by the chemical plant is 100 million cubic feet per day. The gas first passes through conventional scrubbers where any absorbent oil entrained in the gas from the absorption plant is trapped and removed. The scrubbed gas is then discharged through a gas-fired tubular heater in order to reach the temperature required for the reaction with oxygen in the oxidation reactor, details of which have not been disclosed.

Oxygen of 90 to 95 percent purity is provided by a large low-temperature unit of Hydrocarbon Research process design. Like other units of this design the installation involves the liquefaction of air and subsequent fractionation of the product. The necessary compression is furnished by eight 800 hp. compressors. Refrigeration is secured by the substantially isentropic expansion of part of the air through an engine rather than by adiabatic expansion through a valve. In contrast

to the piston-type engines which prevailed in earlier units built for the army, the engine used at Winnie is of the turbine type chosen for smoother operation. Power from the engine is utilized for process purposes. The bulk of the equipment in the unit is necessarily built of aluminum.

Oxidation products leaving the reactor flow to a conventional absorption tower utilizing water as the absorbent. Residue gases leave the absorber and enter a gas distribution system. The water solution is stripped of the chemical products in an ordinary still and the product vapors leave the still and are condensed and fractionated.

The fractionating system for separation of the formaldehyde, acetaldehyde and methanol consists of the customary low-pressure bubble cap towers. Stainless steel is used in those portions of the fractionating system which are in contact with formaldehyde. A residue consisting of a water solution of salts of organic acids is withdrawn from the base of the fractionator where methanol and water vapors are being removed prior to their final separation.

Methanol Oxidation

Although some of the formaldehyde is produced directly from the oxidation process, the greater part is manufactured by oxidation of a portion of the methanol. The methanol oxidation step involves the usual equipment and catalyst employed in this process. The methanol is vaporized in a steam heater, combined with compressed air and passed through a converter containing metallic copper as the catalyst. The resulting mixture of unreacted methanol, formaldehyde, water and residual gases is cooled and passed into a primary separation tower where the gases are released. The mixture of formaldehyde, water and methanol is pumped to a second tower where formaldehyde is withdrawn from the base and sent to storage. The methanol from this tower, combined with any that is scrubbed by water from the residual gases, is recycled to the methanol vaporizer.

Because of the corrosiveness of formaldehyde the fractionating towers and other equipment which come into contact with the chemical are of stainless steel or have stainless linings.

Formaldehyde in solutions from 50 percent on down, inhibited or uninhibited, can be produced. Required proportions of water and methanol inhibitor are added to the product in cone roof tanks lined throughout with baked-on phenol-formaldehyde linings designed to withstand 50 percent formaldehyde at 190 deg. F. Steam coils are installed in the tanks to maintain the product at temperatures sufficiently high to minimize polymerization.

Methanol is stored in ordinary floating roof tanks which are without linings. The acetaldehyde is stored in horizontal cylindrical pressure tanks, also unlined.

With respect to shipment of products, 10,000-gal. tank cars are being used at present. In order to allow formaldehyde to be shipped in any of the cars, all are lined with baked-on phenol-formaldehyde resin which, like that in the formaldehyde storage tanks, is designed to withstand 50 percent formaldehyde at 190 deg. F. All cars are also insulated with 6-in. Fiberglas insulation, which permits uninhibited grades of formaldehyde in high concentration to be shipped during cold weather at adequately high temperature to avoid polymerization. During extremely cold weather it is expected that the daily temperature drop in the cars will be no more than about 2 deg. F. Centrifugal pumps load the three chemicals into the cars. Pumps and lines carrying formaldehyde are of stainless steel.

Serious consideration is being given to shipment of products by pipeline and water. The chemicals could be moved by pipeline to the McCarthy terminal on the Neches river near Port Neches, which is about 30 mi. from Winnie.

Turning to the general features of the plant, cellular glass insulation, with a few exceptions, is used throughout. Vessels are covered with glass blocks and piping is covered with molded forms. Glass was specified not only because of its satisfactory insulating qualities but also because the material happened to be more readily available than other types of insulation. Pumps for critical services are spared. Centrifugal pumps predominate and are both of the steam and motor driven types. In keeping with general practice along the Gulf Coast, outdoor construction, including the boilers, is the rule. Fractionation towers and other principal structures are designed to withstand hurricane winds up to 125 mph.

The plant has its own utilities systems with the exception of electric power, which is purchased. The steam plant consists of three Union Iron Works bent tube, gas fired, induced draft boilers, each with a rated capacity of 70,000 lb. per hr. A Hungerford and Terry water treating plant, a parallel hydrogen cycle cation exchanger and sodium cycle softener with a degasifier for the treated water, furnishes treated water for boiler feed and process requirements.

Fresh water is obtained from two wells north of the plant site. The main cooling tower is a Fluor four-cell, induced draft tower. Facilities are installed for treating the raw water in the sump with metaphosphate, sulphuric acid and chlorine. The oxygen unit cooling water system has a separate cooling tower, a Fluor two-cell induced draft tower having a rated capacity of 6,800 gpm. and a cooling range of from 103 deg. F. to 88 deg. F.

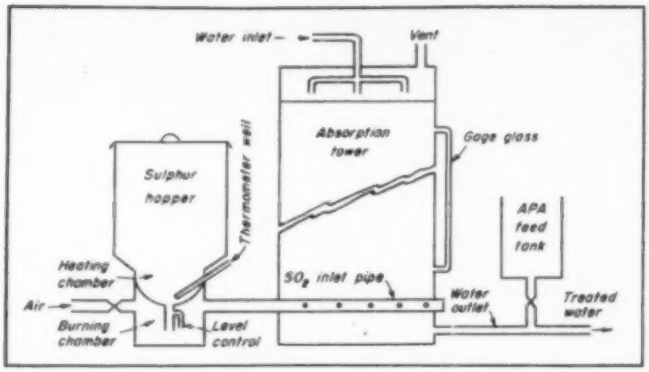
Fuel Gas Distribution

Fuel gas enters the plant at a pressure of 800 psig. and first passes through a vertical separator designed to remove any entrained liquids. The gas is then discharged through two reducing valves where its pressure is reduced to 40 psig, at which pressure it enters the plant distribution header. Branch lines, each with a reducing valve, then carry the gas to the various loads including the boilers, high-pressure heater for the oxidation unit feed gas, furnaces for the methanol-to-formaldehyde unit, feed compressor engines and exhauster engines, circulating water pump engines, water well pump engines, starting air compressor engines, tank car unloading, and blanketing over liquids in storage.

There are two air systems. One furnishes air for starting all gas engines and the other provides air for instruments and other services. Air from the instrument air compressors passes into a shell and tube aftercooler, then into a common discharge header and finally into a moisture knock-out drum from which the main plant air distribution header originates. Instrument air is taken from the main header and is reduced in pressure to 40 psig. Instrument air for the oxygen unit is also furnished from this same system. Provision has been made at the oxygen unit for the starting air compressors to pick up the oxygen instrument air load if the supply at the chemical plant should fail.

The fire water system is a loop of 8-in. line with a Union centrifugal pump driven by a Waukesha gasoline engine and is so laid out that the pump can take suction either from the 10-in. fresh water main from the wells or from the main plant cooling tower sump.

General contractor for the plant was Tellepsen Construction Co., Houston. Wyatt C. Hedrick, Inc., Houston, was the architect and engineer for the project. Fomac Engineers, Houston, had charge of pilot plant work and process design. G. M. Granahan is vice president and general manager. Hugh A. Neal is plant manager.



SULPHUR BURNER

makes SO_2 for water treatment because H_2SO_3 made on the spot is cheaper than purchased H_2SO_4 for controlling pH.

R. C. Ulmer and J. F. Churchill
E. F. Drew & Co., New York

In recent years the chemical and physical aspects of scale and deposit formations and of corrosion in cooling water systems have been fairly well determined. Delignification or deterioration of wood in such systems also is understood. In the cases mentioned, the presence of too much alkalinity, that is a high pH, in the cooling water is the chief cause of the difficulties. In the past, little if anything has been done to correct these situations largely because the acid required is hazardous to use and other acidic materials are too costly. Now owing to the practical application of a sulphur burner and a proper anti-precipitation agent to these problems, a practical solution is possible at little cost and with little maintenance and labor. Proper operation of equipment at high efficiency and capacity and with a minimum of cost and upkeep is thus insured.

A consideration of the shortcomings of previous corrective means, together with the results of investigative research has led to the adoption of the use of an effective anti-precipitating agent in conjunction with a sulphur burner to control pH for the elimination of cooling water problems. The essential equipment consists of a sulphur burner for forming sulphur dioxide and an absorption tower for absorbing the sulphur dioxide in the cooling water. The anti-precipitating agent is fed into the effluent from the absorption tower.

The burner is so designed and constructed as to require little care. In fact, once the burner is in operation all that is necessary is to fill the sulphur hopper once a day or so and to adjust the air supply. Either a compressed air line or a blower can be used to supply the air. The amount of air passed through the burner chamber governs the amount of sulphur burned and consequently the amount of alkalinity reduction. The leveling of sulphur in the burner chamber is automatic, all that is necessary being to adjust gas flow through and around the hopper so as to maintain the molten sulphur in a desired temperature range. A bypass valve is provided for this purpose. The gas passes from the burner to the absorption tower. A part or all of the water from the heat transfer equipment may be passed through the tower. The tower will handle 100 gpm. satisfactorily. This makes possible treating very large volumes of water such as are involved in large cooling towers or in large boiler plants since only a small fraction need be passed through the burner-tower combination.

The burners are currently available in three sizes: 3 to 15 lb. per hr. of sulphur, 1 to 5 lb. per hr., and 0.2 to 1 lb. per hr. On the basis of sulphuric acid this corresponds to: 12.4 to 46.5 lb., 3.1 to 15.5 lb., and 0.62 to 3.1 lb. per hr. of sulphuric acid. Larger burners can be supplied or several of the large size can be used in case more capacity is required.

In reducing alkalinity, 0.32 ppm. of sulphur when burned will neutralize 1 ppm. of alkalinity expressed as calcium carbonate. Consequently, 0.32 lb. of sulphur will be required for each ppm. of alkalinity reduction desired for each 1,000,000 lb. of water involved. Expressed on the basis of 1,000 gal., this amounts to 0.0027 lb. of sulphur per ppm. alkalinity reduction desired per 1,000 gal. of water involved.

Approximately 3.1 times by weight as much sulphuric acid as sulphur is required for alkalinity reduction. Currently sulphur costs about 0.9c. per lb. and sulphuric acid about 1.6 per lb. Consequently, 0.9 cent's worth of sulphur will reduce as much alkalinity as 4.9 cents' worth of sulphuric acid. On the basis of a million pounds of water, the following are the pertinent data per ppm. reduction:

	Sulphuric Acid	Sulphur
Amount required, lb.	0.99	0.32
Cost, C.	1.6	0.29

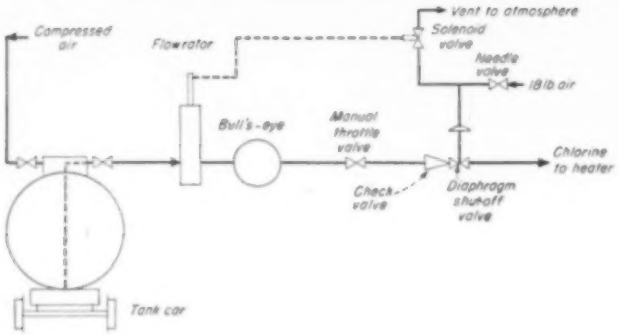
Consequently, it is obvious that in addition to being more convenient and safe to use, sulphur through the use of the sulphur burner is much cheaper than sulphuric acid for alkalinity reduction. Thus pH control is possible and practical and, when the burner is used in conjunction with a proper anti-precipitating agent, scale and deposit formation and corrosion will be eliminated. It should be noted that through the use of the sulphur burner proper pH control is made possible without the hazards and high costs normally involved in previously used methods.

As to algae and slime control, fairly satisfactory results have been obtained with materials currently available. The chief materials being used are chlorine and compounds based on chlorine, phenates or compounds based on phenol, copper sulphate, and more recently bromine and complex ammonium compounds. In some cases the organisms build up a tolerance to any one of the materials listed, in which case it may be necessary to switch to one of the others.

Although too recent for any definite conclusion, there are indications that the use of the sulphur burner will decrease or eliminate the growth of algae and slime. At present it is not known whether the action is one of toxicity or of decreased oxygen content.

With respect to delignification, little attention has been given this problem until recently. Delignification of wood is eliminated and prevented through control of pH with the sulphur burner. A pH of 8.0 to 8.5, which is necessary in any case for scale prevention, insures little if any attack on the wood.

Based on a paper presented at the California Natural Gasoline Association meeting in Los Angeles, Sept. 2, 1948.



Unloading Controls automatically close chlorine line when tank car is emptied, permitting discharge at maximum rate right up to the end. Left to right in photo: Flowrator; bull's-eye; throttle, check and shut-off valves.

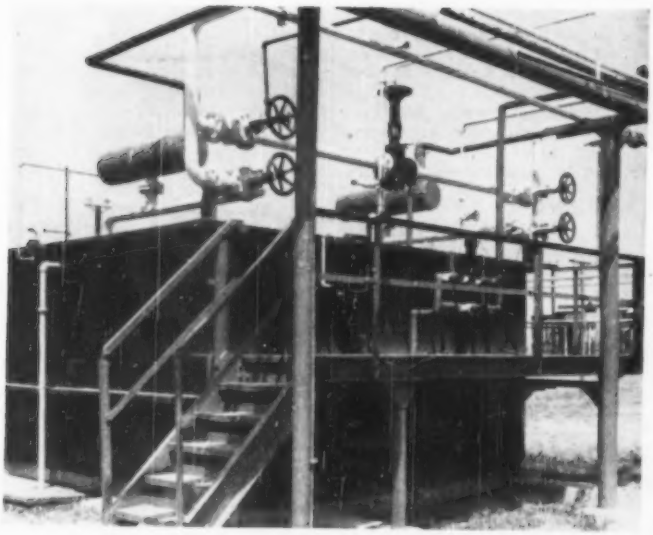
New Ideas for

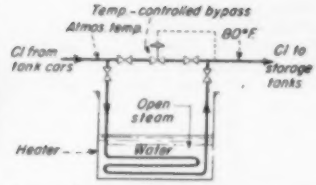
HANDLING CHLORINE

Unloading controls, pressuring system, expansion chambers, dual safety valves and other features make this new installation safer and more efficient.

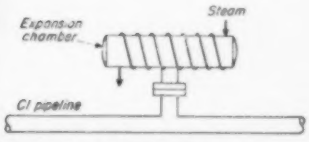
J. V. Hightower
Southwestern Editor
Chemical Engineering

Some ingenious features are incorporated in the chlorine handling system which Jefferson Chemical Co. has developed for its new plant at Port Neches, Tex. This is the plant where Jefferson manufactures ethylene oxide and other chemicals from petroleum

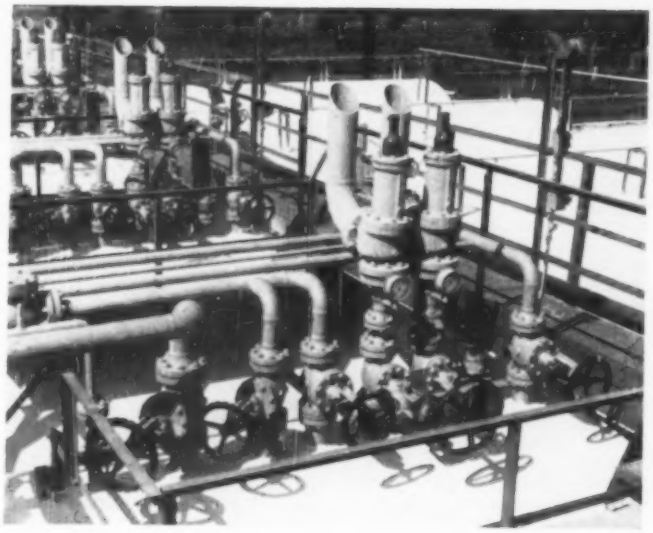


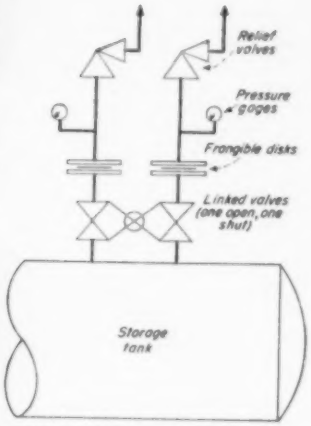


Pressuring System. Chlorine heater box (drawing and photo) permits storage under own vapor pressure, practically eliminates air padding of storage tanks.



Expansion Chambers, steam heated to insure vapor space, protect chlorine lines from rupture. Photo shows two.





Safety Valves. Dual arrangement cuts chlorine loss should one disk fail prematurely. Photo shows gear-linkage.

refinery gases (*Chem. Eng.*, April 1948). Among the details which should interest large users of chlorine: (1) the automatic control arrangement for unloading liquid chlorine from tank cars; (2) the pressuring system for the chlorine storage tanks; it virtually eliminates the need for pressuring with air (process requirements demand minimum air contamination); (3) the steam heated expansion chambers to avoid ruptures of chlorine lines; and (4) the safety valving for pressure relief on the storage tanks.

Unloading Controls

The only point at which air contacts chlorine is in the tank car, where it is used to eject the chemical. A two-stage reciprocating compressor produces 160-lb. air for this operation. The compressed air is freed of moisture when it passes from the compressor through two chambers containing activated bauxite, where the dew point of the air is reduced to −50 deg. F. to minimize corrosion. To avert contamination of the dryers with chlorine in the event of an air failure resulting in a backflow of chlorine vapor from the tank car there is provided a low-pressure alarm and an automatic quick closing valve downstream from the dryers.

Under the pressure of dry air the liquid chlorine moves up through two

carbon steel eductor pipes and leaves the car through ball flow check valves, then enters a Flowrator and an automatic shut-off mechanism.

The unloading rate is 15,000 lb. per hr., governed by the ball flow check valves. The automatic arrangement for closing the flow line is considered the most novel feature of the entire chlorine handling system in the plant, as it eliminates guesswork in unloading. Were the arrangement not used, an operator would have to estimate when a car is empty by listening to the operation of the ball check valves on the car. With the automatic arrangement a car can be emptied in 7.5 hr. by discharging at the maximum possible rate.

The Flowrator is fitted with a single Mercoid switch, the contact of which closes when liquid chlorine ceases to flow through the Flowrator. When this occurs, air from the tank car then enters the Flowrator, causing the float to drop. In turn, this actuates the Mercoid switch which then energizes a solenoid valve, and the solenoid valve causes a diaphragm controlled shut-off valve to close.

During the unloading the solenoid valve is de-energized (closed) in order to keep an 18-lb. air pressure on the diaphragm of the shutoff valve. When the Mercoid switch closes as air from the tank car enters the Flowrator, the switch energizes and opens the solenoid, and air is thereby vented off from the diaphragm valve to the atmosphere more rapidly than the 18-lb. air can bleed through a needle valve to the diaphragm. In effect this is a failure of air to the diaphragm shut-off valve and it closes. It may be opened manually by means of a handwheel located on the top work.

The time lag between the opening of the solenoid valve and the closing of the diaphragm shut-off valve is sufficient to permit incoming air from the empty tank car to purge any remaining liquid chlorine and vapor from the system all the way from the tank car valves to the manual throttle valve which regulates the flow of chlorine.

Too high a rate of flow of chlorine from the car will cause the ball check valves on the car to close, interrupting the movement of chlorine through the Flowrator. The Flowrator float will then drop and cause the diaphragm shut-off valve to close. That this has happened rather than that the car has been discharged can be noted from the fact that a bull's-eye installed downstream from the Flowrator is still full of liquid chlorine and its flapper is in the down position.

A check valve is installed in the chlorine line immediately upstream from the diaphragm shut-off valve. The purpose of this check valve is to prevent any backflow of chlorine from the storage tanks and thereby to avoid loss of chlorine in the event of a line breakage upstream from the Flowrator. The check valve also prevents pumping from one car to another during the simultaneous unloading of several cars.

Pressuring System

Liquid chlorine, after leaving the diaphragm shut-off valve, then enters a heater. Jefferson Chemical Co. officials believe this is a unique method of creating pressure within the chlorine storage tanks; it virtually eliminates the need of air padding in the tanks. In fact, it is only during the winter months that any air is required.

The heater is an open steel box containing water heated with steam supplied directly to the water. Liquid chlorine passes through a carbon steel pipe coil in the water and the temperature of the chlorine is raised to 80 deg. F. Any tendency of the temperature to rise above this point is offset by the use of a bypass around the heater through which unheated chlorine is bled by automatic temperature control whenever the temperature of the heated chlorine exceeds 80.

From the heater the chlorine enters a header connecting ten horizontal, carbon steel storage tanks. These tanks, which are not insulated, are coated with a highly reflective, fume proof paint. At the tops of the tanks are water sprays which may be turned on manually at a remote point. The sprays are for use in the event of a fire in the vicinity or if the tanks otherwise become too warm. Each tank is fitted with a liquid level alarm which sounds slightly before the filling level is reached. Reflex-type gage glasses are also provided.

Safety Valves

A carefully designed safety system protects the storage tanks against excessive pressures. Each tank has a dual valve and frangible disk arrangement. Two nozzles are mounted adjacent to each other at the top of the tank, and on the nozzles are fitted valves so interconnected that one cannot be closed without opening the other. The linked valve arrangement is intended to prevent the loss of chlorine if one of the disks should fail prematurely and have to be removed. Above each valve is a frangible metallic disk, used in normal service to block off chlorine vapors from the seats of the relief valves mounted immediately above the disks.

The disks are designed to rupture at the setting of the relief valves. Between disk and relief valve is a small pressure gage which will indicate pressure if there should be a premature failure of the disk. Relief valve outlets are shielded with thin lead diaphragms to prevent accumulation of moisture in the valves. These diaphragms have bursting pressures of about 50 psi.

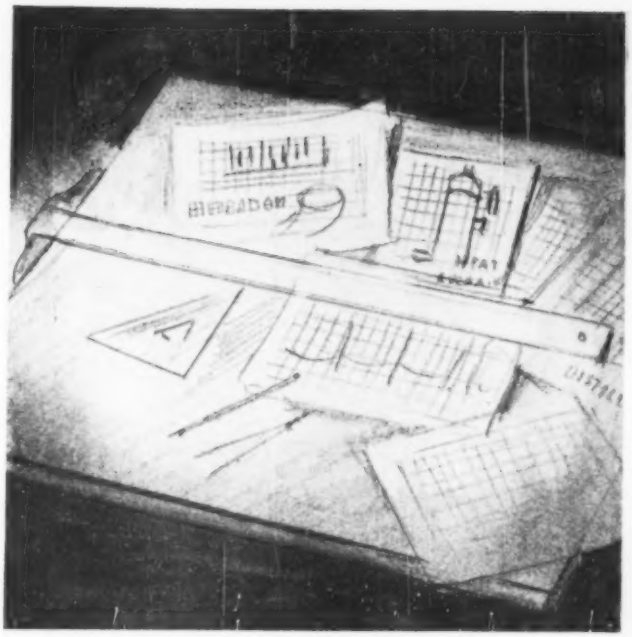
Prior to entering the process equipment of the plant the liquid chlorine, after leaving the storage tanks under its own vapor pressure, flows through a vaporizer, which is a kettle-type reboiler. Hot water passing through carbon steel tubes furnishes the heat required to vaporize the clorine at a pressure of about 44 psi. The reboiler has a double tube sheet in order to minimize leakage of chlorine around the tubes. The chlorine vapors are split into two streams. The major portion goes into the production of ethylene oxids. The remainder is used in the water treating area of the plant to inhibit algae growth in the cooling tower and to destroy bacteria.

Expansion Chambers

Expansion chambers are installed to prevent line ruptures at every point in the chlorine system where there is a chance that liquid chlorine will be trapped. An unusual device to assure the presence of vapor space in the chambers is the use of steam heated coils wrapped around the outside walls of the chambers. To be certain that the space inside is filled with vapor instead of liquid during the operation of the line, the chamber temperature is maintained at a point sufficiently high to produce a vapor pressure slightly greater than the operating pressure of the line. The chambers are designed to provide for a 12 percent expansion of the trapped volume of chlorine.

Occasions arise when it is necessary to evacuate parts of the chlorine system for changes and repairs. To avoid loss of chlorine to the atmosphere under these conditions a "sniff" system of vacuum lines has been installed to withdraw chlorine from any part of the system, such as unloading, storage and vaporization. An evacuation header runs past the storage tanks, the heater and out to the unloading rack, and branches reach other points. Two Nash Hytor vacuum pumps, one a standby, provide the suction required. Chlorine passed through these pumps is either recovered and used or is disposed of by neutralization, depending on the quantity involved.

To furnish warning in the event that undue amounts of chlorine are detected in the atmosphere, push button alarm stations are located at the unloading rack, storage tank area and the air compressor. So far, no occasion has arisen to use the alarm.



DATA FOR DESIGN

In English units and with engineering accuracy, these tables and graphs give vapor pressure, latent heat, specific volume, density and enthalpy.

Thermodynamic Properties of Chlorine

R. E. Hulme and A. B. Tillman

Diamond Alkali Co.
Painesville, Ohio

THE PRODUCTION and use of chlorine has grown by leaps and bounds during the past few decades. A relatively few years ago chlorine was used primarily for its bleaching and bactericidal value, and while such uses of the element are still extensive, its potential value as a tool in industrial organic syntheses is being exploited on an amazing scale. There are few industries which are not affected in some measure by chlorine and products derived from it. And yet, in spite of this tremendous growth, the literature on fundamental properties of chlorine leaves much to be desired. Apparently so much effort was devoted to exploring the many practical uses to which chlorine can be put that its fundamental properties were somewhat neglected.

Much of the information which is readily available on chlorine is in the form of handbooks published by the several producing companies and more recently by the Chlorine Institute, Inc. These are based on the work of early investigators, Pellaton[1] and Knietsch[2] being most frequently quoted. Scattered through the literature are the results of other early workers, Regnault in 1862, Ladenburg in 1878, Martini in 1880, Strecker in 1881, DeWar in 1884, and Mathias in 1899. More recently, Pickering,[3] Ross and Maass,[4] and Giauque and Powell[5] have reported their work and, especially in the last two instances, have made valuable contributions on the properties of chlorine.

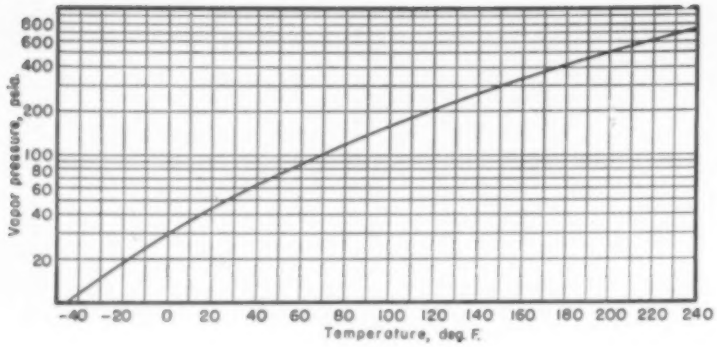
We believe there is a real need for a critical evaluation of the literature on properties of chlorine and further that it would be helpful if the results of such a study were put in the form of charts and tables to facilitate their use. We have chosen English units in this work and have defined the probable limits of error of our correlations. We consider the results sufficiently precise for most engineering calculations.

Vapor Pressure

Giauque and Powell[5] have determined the vapor pressure of chlorine with a high degree of precision from the triple point at 172.12 deg. K. (309.78 deg. R.) up to 240.05 deg. K. (432.18 deg. R.). Their results are quite accurately expressed by equation (1):

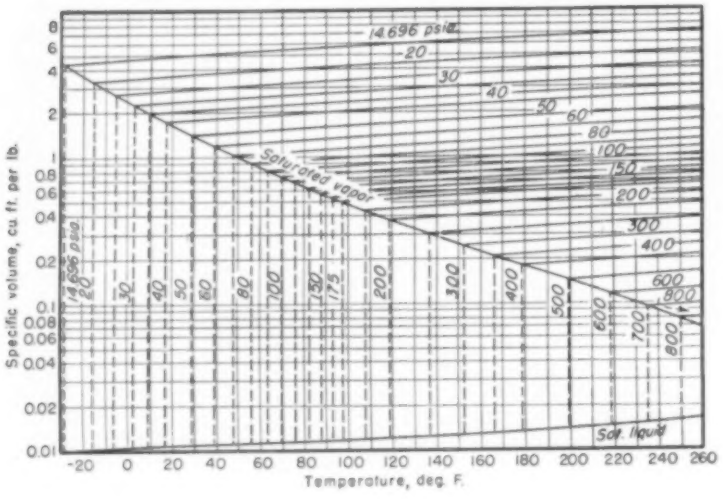
$$\log_{10} P = -1414.8/T - 0.01206\,T + 1.34 \times 10^{-6} T^2 + 9.91635 \quad (1)$$

They also determined the normal boiling point to be 239.05 deg. K. (430.38 deg. R.). This compares with 238.6 deg. K. by Pellaton[1] and 239.5 deg. K. by Knietsch.[2] At temperatures up to the critical, the vapor pressure data of the different investigators vary quite widely. Extrapolation of Giauque and Powell's data up to the critical temperature gives a critical pressure which falls between values given by Knietsch and Pellaton. Since Giauque and Powell made no claims for accuracy beyond the boiling point, their equation was used only to 260 deg. K. (468.18



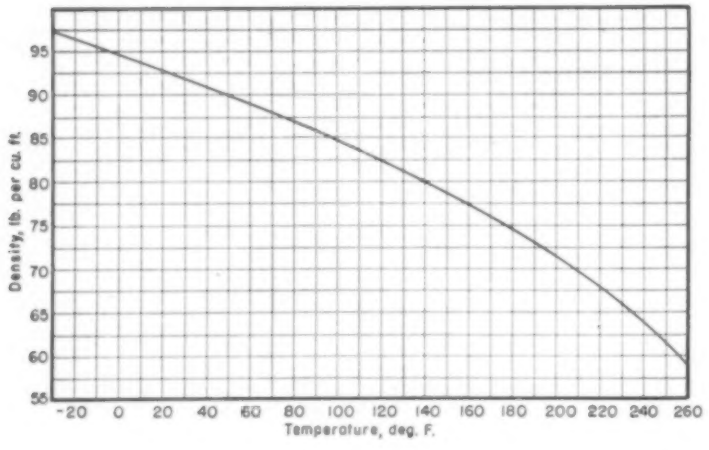
1. Vapor Pressure

vs. Temperature for Chlorine



2. Specific Volume

vs. Temperature and Pressure for Chlorine



3. Density

vs. Temperature for Liquid Chlorine

deg. R.). Beyond this point an equation (2) was derived to represent the vapor pressure up to the critical temperature 144 deg. C., as reported by Pellaton:

$$\log_{10} P = -1901.988/T - 6.95 \times 10^{-4} \log T + 5.78109 \quad (2)$$

At 300 deg. K. (540 deg. R.) equation (2) gives values for vapor pressure which are 1.33 percent lower than the extrapolated Giauque and Powell equation and 1.29 percent higher than Pellaton's data. At 340 deg. K. (612 deg. R.), the deviation is 0.83 percent above Pellaton's data. Since his critical pressure and temperature data were chosen as the best available, the equation gives Pellaton's critical pressure (76.1 atm.) at the critical temperature of 144 deg. C. (291.2 deg. F.). The pressure, P, in equation (2) is pounds per square inch absolute and temperature, T, is in degrees Fahrenheit absolute or Rankine. For our calculations equation (1) was also transposed to English units to give equation (3):

$$\log_{10} P = 9.20274 - 2546.64/T - 0.0067\,T + 4.1358 \times 10^{-6}\,T^2 \quad (3)$$

Results of the calculations are included in Table I and shown in Fig. 1.

Latent Heats of Vaporization

The latent heat of vaporization of liquid chlorine at the boiling point (430.29 deg. R.) was very accurately determined by Giauque and Powell[5] and found to be 4,878 ± 4 cal. per mol or 123.82 Btu. per lb. A check calculation of latent heat using our specific volume data checks Giauque and Powell's value quite accurately. By applying the method of Gordon,[6] using Pellaton's critical temperature and water as the reference substance, latent heats of vaporization were calculated for a series of temperatures from −60 deg. F. up to the critical. Pellaton[1] also reports calculated values up to the critical. We list below our values and those of Pellaton by way of comparison.

Comparison of H_{fg} Calculated and Pellaton's Calculated Values

Deg. F.	Present Work Btu. per Lb.	Pellaton Btu. per Lb.	Percent Deviation
−30.1	123.91	121.5	1.95
−22	122.86	119.7	2.58
− 4	120.49	115.7	3.83
14	118.04	111.8	5.29
32	115.32	108.0	6.35
50	112.65	104.0	7.68
68	109.86	100.0	9.00
104	103.31	92.7	10.28
140	95.38	85.3	10.59
176	85.98	77.4	9.98
212	74.05	67.5	8.85
248	57.57	55.4	3.77
284	24.31	22.5	7.45
291.2	0	0	0
− 7.6	121.14	121.32	0.15*
46.4	113.45	112.86	−0.49*

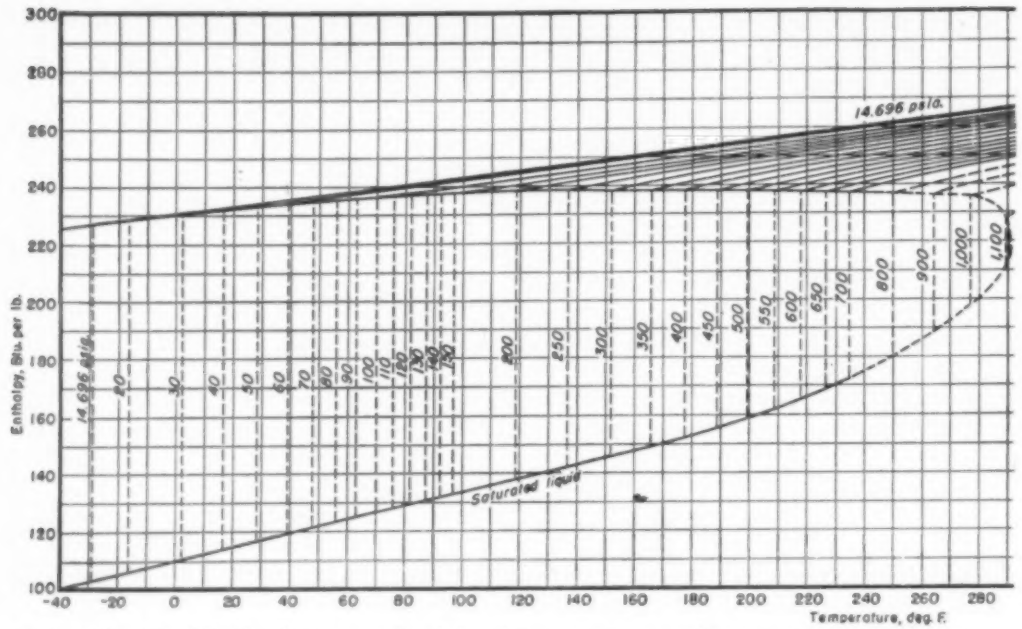
* Gmelin's "Chlor" credited to Knietsch.

Gordon[6] shows that if a value for the latent heat is accurately known at one temperature, his method gives values which check well with reliable experimental data up to the critical temperature. Pellaton's calculations are based

Table I—Properties of Saturated Chlorine

Base: Solid at 0 deg. R. or − 459.58 deg. F.

Temperature, Deg. F.	Pressure (Psi.) Absolute	Pressure (Psi.) Gage	Enthalpy (Btu. per Lb.) Sat. Liq.	Enthalpy (Btu. per Lb.) Vaporization	Enthalpy (Btu. per Lb.) Sat. Vapor	Liquid Density, Lb. per Cu. Ft.	Specific Volume (Cu. Ft. per Lb.) Liquid	Specific Volume (Cu. Ft. per Lb.) Vapor
t	P	p	h_f	h_{fg}	h_g	D	V_f	V_g
−50	8.603		98.28	126.26	224.54	99.03	0.01009	7.0838
−40	11.286		100.63	125.08	225.71	98.20	0.01018	5.5261
−30	14.442		102.98	123.91	226.89	97.35	0.01027	4.4063
−29.29	14.696	0.00	103.15	123.82	226.97	97.22	0.01027	4.3375
−20	18.338	3.64	105.33	122.60	227.93	96.49	0.01036	3.5354
−15	20.574	5.88	106.51	121.96	228.47	96.04	0.01042	3.1787
−10	23.015	8.42	107.68	121.30	228.98	95.60	0.01046	2.8690
− 5	25.674	10.98	108.86	120.63	229.49	95.18	0.01051	2.5903
0	28.567	13.87	110.03	119.96	229.99	94.69	0.01056	2.3465
+ 5	31.703	17.01	111.21	119.26	230.47	94.23	0.01061	2.1307
10	35.098	20.40	112.38	118.57	230.95	93.76	0.01066	1.9390
15	38.766	24.07	113.56	117.86	231.42	93.29	0.01072	1.7682
20	42.719	28.02	114.73	117.15	231.88	92.81	0.01077	1.6159
25	46.713	32.02	115.91	116.43	232.34	92.33	0.01083	1.4881
30	51.193	36.50	117.08	115.69	232.77	91.83	0.01088	1.3668
35	55.999	41.30	118.26	114.95	233.21	91.36	0.01094	1.2574
40	61.146	46.45	119.43	114.19	233.62	90.86	0.01100	1.1586
45	66.642	51.95	120.61	113.43	234.04	90.36	0.01106	1.0691
50	72.523	57.85	121.78	112.65	234.43	89.85	0.01113	0.9880
55	78.786	64.09	122.96	111.85	234.81	89.34	0.01119	0.9140
60	85.452	70.76	124.13	111.06	235.19	88.82	0.01125	0.8470
65	92.540	77.84	125.31	110.26	235.57	88.35	0.01132	0.7857
70	100.07	85.37	126.48	109.44	235.92	87.87	0.01138	0.7296
75	108.04	93.34	127.66	108.63	236.29	87.34	0.01145	0.6783
80	116.49	101.79	128.83	107.78	236.61	86.81	0.01152	0.6317
85	125.42	110.72	129.99	106.88	236.87	86.27	0.01159	0.5888
90	134.85	120.15	131.15	105.88	237.03	85.72	0.01166	0.5494
95	144.80	130.10	132.31	104.98	237.29	85.16	0.01174	0.5132
100	157.09	142.39	133.47	104.04	237.51	84.61	0.01181	0.4738
110	177.95	163.25	135.79	101.95	237.74	83.48	0.01197	0.4207
120	202.95	188.25	138.11	99.82	237.93	82.32	0.01214	0.3700
130	230.43	215.73	140.43	97.52	237.95	81.14	0.01232	0.3261
140	260.51	245.81	142.75	95.38	238.13	79.91	0.01251	0.2882
150	293.34	278.64	145.11	92.94	238.05	78.64	0.01272	0.2554
160	329.03	314.33	147.55	90.23	237.78	77.31	0.01293	0.2269
170	363.73	353.03	150.11	87.76	237.87	75.92	0.01317	0.2047
180	409.52	394.82	152.83	84.77	237.60	74.47	0.01342	0.1800
190	454.55	439.85	155.74	81.72	237.46	72.94	0.01370	0.1609
200	502.93	488.23	158.88	78.31	237.19	71.34	0.01401	0.1438
210	554.79	540.09	162.29	74.83	237.12	69.64	0.01436	0.1287
220	610.21	595.51	166.01	70.90	236.91	67.85	0.01437	0.1151
230	669.31	654.61	170.11	66.73	236.84	65.96	0.01516	0.1030
240	732.17	717.47	174.70	62.10	236.80	63.93	0.01563	0.0895
250	798.93	784.23	179.93	56.83	236.76	61.76	0.01619	0.0791
260	869.62	854.92	185.99	50.71	236.70	59.22	0.01688	0.0692
270	944.38	929.68	193.09	43.53	236.62	55.82	0.01791	0.0597
280	1023.3	1008.6	201.48	35.64	235.64	50.82	0.01967	0.0499
290	1106.3	1091.6	211.45	12.44	*23.89	37.42	0.02672	0.0306
291.2	1151.93	1139.24	218.34	0.00	*18.34	35.78	0.02794	0.0279



upon vapor densities of liquid and vapor over the whole temperature range and the slope of the vapor pressure curve. Particularly at the higher temperatures, latent heats calculated by this method are questionable because of inaccuracies in the data. We prefer Gordon's method, making use of the precise experimental latent heat determination by Giauque and Powell. The accompanying table also shows two comparisons of our values with those listed in Gmelin's "Chlor" credited to Knietsch.

Specific Volume

Rather than use the density data of any one worker, the results given by Knietsch, Lange and Pellaton were plotted and a smooth curve drawn through the apparent mean position. Pellaton had reported the only data in the upper temperature region. The values read from the curve were smoothed by differences and then converted to English units for inclusion in Table I. Results are plotted in Fig. 2. For saturated vapor, the specific volume was obtained through use of the exact form of the Clausius-Clapeyron equation. The slope of the vapor pressure curve dp/dt was determined by differentiating equations (2) and (3), the latent heats were previously determined as described above and the specific volumes of the liquid were obtained as indicated.

Comparison of Density of Gaseous Cl_2

For calculating the specific volume of the superheated gas at any temperature and pressure, an equation of state is needed. Ross and Maass[4] determined the density of gaseous chlorine at four temperatures from 15 deg. C. to 75 deg. C. and at 1 and 2 atm. pressure. They derived an equation to fit their data and compared their work with the data of Pier (1908) and of Jacquerod and Tourpaian (1913). We also have the work of Eucken and Hoffman,[5] who give the equation (4) for the volume of chlorine gas:

$$V = RT/P + 39 - 8.5 \times 10^6/T^{2.6} \qquad (4)$$

This equation is much simpler and easier to handle than that given by Ross and Maass. It was considered important to compare the calculated values of these workers to determine how well they would agree with experiment. The absolute densities were calculated using equation (4) and are tabulated with the experimental data of Ross and Maass and also Pier.

Comparison of Density of Gaseous Cl_2

Temperature, Deg. C.	Pressure, Atm.	Eucken and Hoffman	Ross and Maass	Experimental
0	1.00	0.003215	0.003212	0.003220*
0	1.10	0.0003170	0.0003168	0.0003167
15	1.00	0.003039	0.003038	0.003037
15	2.00	0.006158	0.006159	0.006161
50	1.00	0.002697	0.002699	0.002700
50	2.00	0.005438	0.005450	0.005453
75	2.00	0.005025	0.005039	0.005038
100.4	1.00	0.002324	0.002327	0.002324*
150.7	1.00	0.002044	0.002046	0.002044*
184.0	1.00	0.001894	0.001896	0.001894*
186.5	1.696	0.003212	0.003217	0.003218*

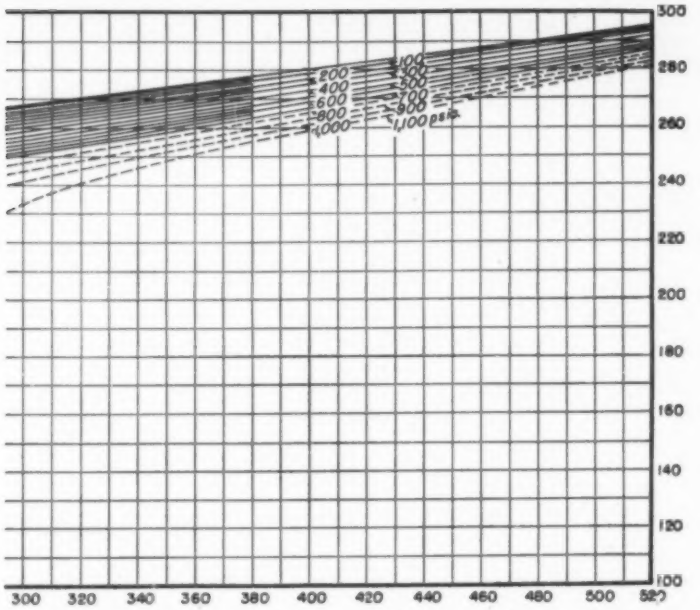
* Experimental values of Pier. Unmarked values are those of Ross and Maass.

From this table, it is seen that the Eucken-Hoffman equation fits the data at 1 atm. and over a wide range of temperature equally as well as the Ross and Maass equation. At higher pressures, however, a pressure correction must be applied to the former so that the calculated values are brought into better agreement with the experimental results. We arrived at equation (5) which gives calculated values up to 75 atm. which agree within 3 percent with Pellaton and Lange over the pressure range from 2 to 75 atm.:

$$V = 82.0557T/P + 39.0 - 122.47 \log P + 0.94P^{0.3} - 8.5 \times 10^6/T^{2.6} - 4.9 \times 10^{-14}P^{6.6} \qquad (5)$$

The results of these calculations are shown in Fig. 3. The values of the saturated volume included in Table I were calculated using α values, as discussed under enthalpy, up to a temperature of 230 deg. F., above this temperature saturated volumes were calculated from latent heats of vaporization.

There are insufficient heat capacity data on chlorine in



4.
Enthalpy

vs. Temperature for Chlorine

the literature to permit evaluation of enthalpy over wide ranges of pressure and temperature so other methods must be used to accomplish this result. The fundamental thermodynamic equation for calculating the enthalpy of a homogeneous substance is as follows:

$$dH = C_p dT + \left[v - T\left(\frac{\partial v}{\partial T}\right)_p \right] dp \qquad (6)$$

For chlorine, the first term in this equation can be evaluated by Eastman's[5] specific heat equation at atmospheric pressure: $C_p = 8.657 + 0.000167t$ where t is in degrees Fahrenheit and C_p is the molal heat capacity.

Graphical Method

The second term of equation (6) requires knowledge of *P-V-T* data over the desired range of temperature and pressure. Deming and Shupe[6] have published a series of papers describing a graphical method they employed for calculating thermodynamic properties of various substances and we have employed the same method. Because of inadequate and discordant data we used α plots, according to Deming and Shupe, for correlation. Briefly, our approach was as follows:

1. Volume residuals (α values) were calculated and plotted against temperature for various pressures. All experimental data, calculated data of Ross and Maass, and calculated data from our equation of state (5) were considered. Best curves were drawn through the points. A check was obtained by extrapolating to saturation and comparing with a value calculated from Giauque and Powell's[3] precise latent heat measurement using the exact form of the Clausius-Clapeyron equation.

2. Cross plots were made to get α vs. P values using points calculated for saturation from latent heats as a guide for the terminal points. Replots of α vs. T were made, giving a smoothed family of curves for various pressures from which calculation of enthalpy change with pressure at constant temperature could be made.

3. Alpha values were tabulated for equal temperature increments at constant pressure from which $(\partial\alpha/\partial T)_p$ values were obtained graphically. These were plotted and smoothed where necessary.

4. Tabulation of α and $(\partial\alpha/\partial T)_p$ were made for a number of different temperatures and for uniform pressure increments. The values of $T(\partial\alpha/\partial T)_p - \alpha$ were obtained and plotted against pressure. Graphical integration gives the change in enthalpy with pressure at constant temperature.

Enthalpy-Temperature Diagram

The data so obtained were incorporated into the enthalpy-temperature diagram shown in Fig. 4. The basic reference point is absolute zero. The enthalpy value of the liquid at its normal boiling point was found by plotting the specific heat data of Giauque and Powell[3] versus temperature, extrapolating to zero absolute, and performing a graphical integration. Zero heat content was assumed at absolute zero.

The enthalpy of liquid chlorine at its normal boiling point was found to be 103.15 Btu. per lb. by this method. We consider the data shown in Fig. 4 to be sufficiently accurate for most engineering purposes and that they will suffice until accurate experimental data over the extrapolated area are available.

The authors wish to express their appreciation to the management of Diamond Alkali Co. for permission to publish this article. The information it presents will be embodied in the chlorine handbook that Diamond is publishing. They also wish to thank Mr. J. R. Tuuri and Charles J. Bleil for assistance in preparing the graphs.

References

[1] Pellaton, *J. Chim. Phys.*, 13, 426 (1915).
[2] Knietsch, Liebigs Ann., V. 259, 100 (1890).
[3] Pickering, Bureau of Standards Scientific Paper No. 341 (1929).
[4] Ross and Maass, *Can. J. Res.* 18 B, 55 (1939).
[5] Giauque and Powell, *J.A.C.S.*, 61, 1971 (199).
[6] Gordon, *Ind. Eng. Chem.*, 35, 851 (1943).
[7] Eucken and Hoffman, *Z. Physik. Chem.*, B-5, 442 (1929).
[8] Eastman, Bureau of Mines Technical Paper 445 (1929).
[9] Deming and Shupe, *Phys. Rev.*, 37, 638 (1931); 38, 2245 (1931); 40, 848 (1932).

The University's Role in the Nation's Research

Whether as collaborator or competitor of industry, its basic contributions must be trained personnel and fundamental knowledge.

Frederick L. Hovde
President, Purdue University
Lafayette, Ind.

As president of one of the largest engineering schools in the world—and one noted for its academic and industrial research, Dr. Hovde is well qualified to discuss the inter-relationships of education and research. This he did most ably when the 1948 Award for Chemical Engineering Achievement was presented to the Shell Development Co. (See Chem. Eng. Dec. 1948 p. 108.)—Editor.

THERE are three distinct types of scientific organizations in our national scientific forces. The universities, both public and private, together with the laboratories of the great philanthropic foundations, constitute the first type. Second are the governmental research and development laboratories, including those of the Armed Forces. Third, are the industrial laboratories of many kinds, all maintained and operated as private enterprise.

The growth of our industrial research laboratories is a comparatively recent development and is forcefully illustrated by these simple statistics: in 1915 there were 100 such laboratories employing 3,000 people and in 1946 there were 2,500 laboratories with 133,500 employees.

Likewise we have seen a stupendous growth in the size and sphere of activity of our governmental laboratories during the war years and now clearly illustrated by the establishment of the great regional atomic-energy laboratories such as Brookhaven, Argonne and Oak Ridge. Indeed, the administration of science has become a major matter of national policy, of deep concern at all levels from the Congress down to the individual citizen.

In the university scene, the picture is not too reassuring or less important. In a recent publication of the Office of Scientific Personnel of the National Research Council reporting the origin of science doctorates in the United States, we find that 90 universities produced 14,905 science doctorates (excluding doctorates in the social sciences and education) during the years 1936 to 1945, inclusive. While there are approximately 1,700 United States colleges and universities engaged in post-high-school education, only 90 of these institutions accounted for practically 100 percent of the nation's graduate research training program in the physical, biological and earth sciences.

The organization and responsibilities of each type are determined in general by the causes which led to their establishment, the nature of the problems they seek to solve, and the objectives of the supporting and controlling organization. The scientific task before the nation is of great variety, magnitude and importance for the maintenance of the nation's strength and preservation of the freedoms of our democratic society. Therefore, in the orderly development of our research institutions there must be no conflict of interest, no limiting of freedom of scientific inquiry from any source whatever, and no diminution of support, both public and private, for the two basic materials on which the whole edifice stands—namely, the education and training of our talent and the new fundamental knowledge we seek about man and nature.

Even though creative scientific activity can be divided into two general categories, called pure and applied science, there are no sharp dividing lines between the two, or between governmental and industrial or university responsibilities for their prosecution. In the course of our national development whenever a particular segment of our governmental or industrial economy needed and could establish research laboratories, such have been undertaken and the economic value needs no more proof than their performance.

There are areas of our national economic organization that cannot establish and maintain their own research programs, either pure or applied. The greatest example is in the field of agriculture where the economic unit of operation is the individual farmer who operates a raw-foodstuffs production factory consisting of land, rain, sunlight, plants and animals. Here the responsibility for research of all kinds and the dissemination of research knowledge has been turned over mainly to the public universities by our government. This investment produces dividends which are reaped by the user—in this case the individual farmer.

There are also many facets of our industrial organization where the unit of operation and control is so small that, individually, they are unable to establish and support research laboratories. Such businesses sometimes combine into associations and the associations establish cooperative laboratories or undertake to finance fundamental research programs by agreement with universities. This type of research program, in general, has developed upon the universities and universities have assumed this responsibility largely because no other agency was available to do the job.

In addition, there are many areas of investigation and study in which the results are of value to all segments of government and industry regardless of size, type and location. I refer to problems in industrial psychology, vision, health, nutrition, transportation, marketing, housing, and recreation.

Who Owns Knowledge?

While a sharp division of responsibility among academic, governmental and industrial research laboratories for the prosecution of both pure and applied research is probably neither possible nor wise, many interested parties believe such a delineation of responsibility should be determined. How far in the field of applied research should university and governmental laboratories go? In addition to this question there are other questions of policy, organization and responsibility which potentially may injure our national scientific forces through restrictions, misunderstandings, or abuses of

scientific freedom. For instance, under our laws the creators or discoverers of scientific activity have secured to them for a limited time the "exclusive right to their respective writings and discoveries." The ownership of knowledge and how it is to be used pose difficult problems and policies today involving national defense and security, monopoly, exploitations, secrecy, limitations on progress, and personal versus public interest. Nevertheless, our laws still provide the all-necessary incentive of private ownership upon which our society has been built.

While endless debate rages about the pros and cons of the ownership and use of knowledge, I believe several things are quite clear. First, we agree that the public interest is always paramount and in the long run is controlling; second, that basic scientific inquiry and knowledge must be disseminated and free for everyone regardless of its sponsorship; and third that in the administration of ownership, the equities of the participating parties in the discovery must be recognized in justice and fairness to all—the individual, the institution, the sponsor, and the public.

When, according to law, the ownership of knowledge is definitely placed, then the owner must administer the trust with a clear recognition of the public interest and the equities of all the participants. It is axiomatic that new policy, new laws, new restrictions, new governmental controls always come through the attempt to remedy abuses of our civil freedoms.

I believe our patent policy has "promoted the progress of science and useful arts" and I believe beyond all question of doubt that when truth comes into conflict with the desires of man or political credos such as we are witnessing in Russian science and recently saw in Nazi science, then there is no permanent progress and the end-result inevitably will be catastrophe.

Here Rests Our Scientific Future

Here are some of the major policy questions the answers to which will determine our scientific future:

1. Will sharp divisions of responsibility between the various types of research organizations develop and, if so, what will be the effect?

2. Is there to be any change in our national policy with respect to the right of private ownership of knowledge?

3. Will the demand of secrecy in the interests of national defense restrict scientific freedom and consequent development?

4. How can we protect scientific freedom from conflict with false political creeds and the desires of selfish and prejudiced men?

5. How are the secrets of atomic energy now wholly owned and controlled by our government to be exploited for the benefit of our people under our system of private enterprise?

6. Who will provide the money to invest in fundamental research and long-range investigation, returns from which may not come for fifty years?

When one analyzes the nature of creative intellectual achievement, the analysis leads inevitably to the consideration of the creative individual. What kind of a person is he? What kind of training should he be given? Under what conditions can creative ability flourish? How many such people are there?

The world produces but few who possess genuine creative ability. But there are probably enough such people if we could find and select them early and see to it that these precious assets are trained and given the opportunity to create. I firmly believe there are just as many superior individuals who are lost to effective national use as are trained in our universities today. They are lost mainly in the jungles of poor family and community environment in both the city and the country. They must be sought, found and given the chance to develop.

Dual Tasks of the University

This is the first and perhaps most fundamental role of our universities, both public and private. It is to discover individual creative talent and provide for its education and training. The process must be carried through the graduate schools until the product is ready to man the research laboratories of the nation in the work of creating and applying knowledge for useful purposes.

Second and equally important role to be played by our universities is in the production of our basic understanding, theory and knowledge of nature and of man himself.

These two tasks are intimately related and it is my belief that all research programs of universities, whether pure or applied, should be so administered that both trained young people and new basic knowledge are the dual output.

The universities have been historically and must continue to be the fountains of new knowledge and trained people. If these fountains fail, then all else that follows in a democracy must necessarily fail also.

The importance and value of basic knowledge is clearly recognized by our great industrial and governmental research laboratories and already they are devoting a considerable portion of their research budgets to basic research. All scientists know of the many great contributions to basic knowledge which have come from the men of our great industrial research laboratories. A wise industrial management will continue this policy.

My closing thesis is that the universities are "the goose that lays the golden eggs" of knowledge. While the industrial laboratories make the omelette of application for public consumption, if there are no eggs, there can be no omelette.

It would be a tragic national mistake if industry and government together failed to invest in the production of new knowledge and the development of the nation's individual talent. Such a course would indicate a woeful lack of understanding of what makes our system of free enterprise tick. We must explore and open the only frontier left to us—the frontier of the mind. Our system works best in an expanding economy. Thinking men rightly fear what may happen if the conditions under which the nation became great are changed.

President Hovde is no stranger to our profession. He graduated in chemical engineering in 1929 from Minnesota (where, incidentally, he was a great football and basketball hero). He spent three years as a Rhodes scholar at Oxford University. Since then he has had a distinguished career as an administrator in education and research, serving during the war as an executive of the Office of Scientific Research and Development. He is now chairman of the Committee on Guided Missiles for the Research and Development Board of the Armed Forces.

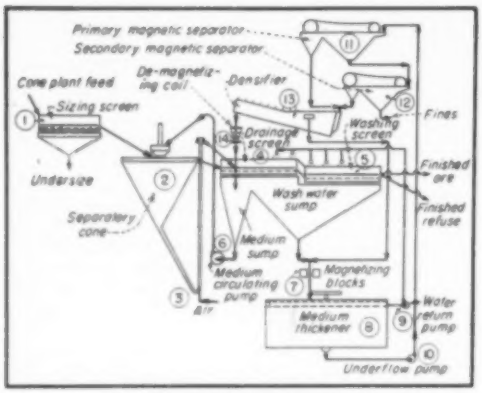


Fig. 1—Standard Heavy-Media flowsheet using ferrous media.

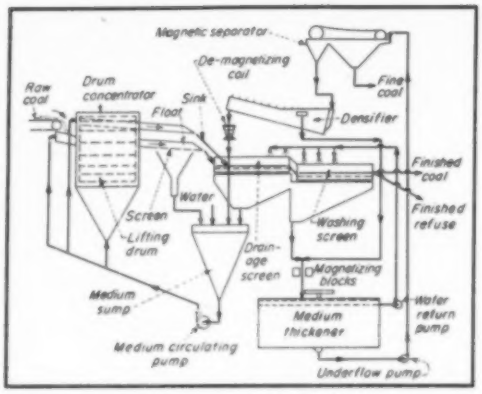


Fig. 2—Flowsheet incorporating Link-Belt drum concentrator.

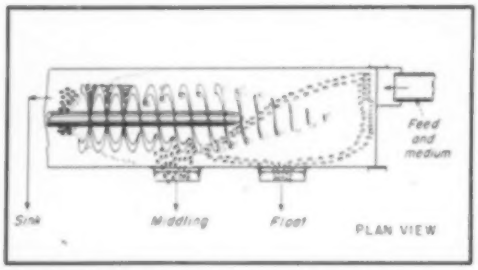


Fig. 3—Classifier type sink-float vessel used for iron ore.

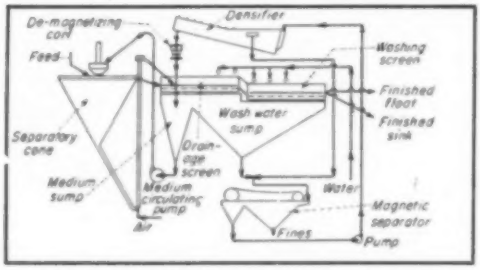


Fig. 4—Mobil Mill simplified flowsheet for small capacities.

Sink-Float Processes

Sink-float separations seem to be coming into their own. They will increase in importance as we dip farther into our poorer mineral and coal reserves.

John T. Sherman

Mineral Dressing Division
American Cyanamid Co.
New York, N. Y.

UTILIZATION of the force of gravity to separate valuable minerals from worthless minerals is one of the oldest and cheapest methods of concentration. The gold miner's pan, sluice boxes, jigs, shaking tables and a host of other devices have been used to separate the heavy constituents of an ore or raw coal from the light. The disadvantages of these methods have been due to their inability to make accurate selections of the particles on the basis of specific gravity because of interference of forces other than gravity acting on the particle.

Engineers have known for many years that precise separation on the basis of specific gravity alone can be obtained by employing a liquid having a specific gravity the same as the gravity at which a separation is desired. When ore or coal particles are introduced into such a liquid, those having a specific gravity higher than that of the liquid will sink, while those that are lighter than the liquid will float. The separation of wood chips from gravel, for example, can be readily accomplished by dumping the mixture into a container filled with water, the specific gravity of the separation being at 1. In such a separation, the only force acting on the particles is that of gravity, assuming that the rate of feed is sufficiently low to allow the particles to sink or float freely and sufficient time is given for this to take place. The obstacle in applying this principle has been the lack of cheap liquids having the desired specific gravities.

Heavy liquids are available with specific gravities as high as 2.96 but they are expensive and, in many cases, toxic. Even so, because the results offer such promise, a great deal of work has been done in an attempt to develop a commercial application. In order to reduce the loss of heavy liquid adhering to the separated particles, they can be given a bath in a cheap liquid that will coat the particles and reduce the adherance of the more expensive heavy liquid. Elaborate washing of the separated particles has also been tried to reduce

Slightly modified from the paper presented under the same title by the author before the Process Industries Division of the American Society of Mechanical Engineers at New York, Dec. 2, 1948.

this loss but, so far, the value of the liquid lost has been too great. Furthermore, the toxicity of the liquids has necessitated the use of closed vessels that are expensive and awkward to use. Despite these handicaps, a commercial unit was installed and operated several years before it was abandoned because of high cost. The only use of true heavy liquid separation today is in the laboratory where this method is used to check the efficiency of separation made by other methods or to determine suitable methods of treatment.

One process in use today for coal cleaning employs a heavy liquid—a solution of calcium chloride in water—but since the top specific gravity possible with such a solution is only 1.4 it must be augmented by a strong upward rising current which introduces forces other than gravity and precludes a true gravity separation.

Solid Suspensions

Having been frustrated in developing a satisfactory heavy liquid process, the mineral dressing engineer has sought to achieve the same results by simulating a heavy liquid. This can be done by mixing a fine, heavy solid with water. While the fine particles are in suspension, the mixture, known as a medium, has a gravity higher than water and can be used to make gravity separations in the same way as can be accomplished by the use of heavy liquids. But this method had its own disadvantages when it was first investigated. The finest particles of the ore or coal, never possible to eliminate entirely by washing and screening, became mixed with the medium and made it impossible to control accurately the specific gravity of the medium. The viscosity of the medium increased as it became contaminated, which resulted in an inaccurate separation and restricted the process to the treatment of relatively coarse particles only, on which viscosity has a lesser influence. In addition, it was difficult to recover the fine medium solids and clean them so that they could be reused. In spite of these drawbacks, the results were sufficiently good to justify commercial use.

The Chance process, first introduced in 1921, utilizes as a medium a mixture of water and silica sand, the latter having a specific gravity of 2.7 and a size range 20 mesh to 100 mesh. The medium is introduced into a large inverted steel cone open at the top and the crushed coal, after screening to reject fine coal, is fed continuously to the cone. The cleaned coal, being lighter than the medium, is carried across the cone and discharges over a weir. The bone, slate and other high-ash constituents of the raw coal, sink to the bottom of the cone and are trapped out intermittently by a double valve. The float and sink products are screened and sprayed to remove the medium which is then dewatered and returned to the circuit.

Although this was an attempt to obtain the effect of a heavy liquid, it was found that the system was actually an adaptation of hindered settling, for in order to keep the coarse sand in suspension, strong currents had to be introduced into the medium by the use of mechanical agitators and by recirculating the medium through pipes entering the cone at various levels. These currents prevent a separation by gravity difference alone, as the rising currents help to buoy up the feed particles and cause separations on the basis of size and shape as well as on specific gravity difference. Another disadvantage of a sand medium solid is that the specific gravity of sand is too low to allow its use for anything but coal cleaning and even some coals, requiring separation at a gravity of 1.80 or higher, are beyond the range of this method.

In order to eliminate the disadvantage of a coarse medium solid and to make possible separations at higher gravities, finely ground barite ($BaSO_4$), a natural mineral with a specific gravity of 4.5, mixed with clay was tried. This gives a much more stable medium and the undesired currents present in the Chance cone are largely eliminated. Froth flotation is used to clean the barite. The Barvoys process, developed in Holland, employs this medium. Barvoys plants are used rather widely in Europe but not in this country, partly because of the cost of the barite and the amount required.

Finely ground magnetite was also tried (the Conklin process), in 1921 for cleaning anthracite coal. Magnetite, a common iron ore (Fe_3O_4), has a high specific gravity of 5.2, but it was not until years later that an efficient means of medium recovery was devised. A number of other mediums were tested with varying success. Several methods were developed for coal preparation in which the fine clay and slate occurring with the coal itself act as the medium solid. The gravity of such a medium is so low however, that it is necessary to introduce upward rising currents to give an apparent gravity sufficient to make a separation.

On the basis of both this earlier work and subsequent developments, it becomes evident that the ideal medium solid should be: (1) heavy; (2) susceptible to simple and efficient recovery; (3) cheap; (4) of suitable fine size and shape; (5) non-corrosive; (6) non-abrasive; (7) hard; (8) widely distributed; and (9) non-objectionable in the final products.

Suitable Media

While few solids known today possess all of these qualifications, three have been found that to a greater or less degree approach the ideal—ferrosilicon, magnetite and galena.

The last of these, galena, is a naturally occurring lead ore (PbS). This solid is heavy, sp. gr. 7.3, it can be recovered by froth floatation, and it can be finely ground. It has the disadvantage of being so soft it abrades readily and is subject to loss as slime; also it is not cheap, especially at today's high lead prices. Galena was first used successfully as a medium at the Mascot Mill of the American Zinc Co. of Tennessee. This process, now known as one of the Heavy-Media separation processes, marked the first commercial use of a simulated heavy liquid for the treatment of metallic and non-metallic ores. With galena it is possible to obtain medium specific gravities of more than 3.0. Several million tons of low grade zinc ore have been treated by Heavy-Media separation at this plant. Another large unit was installed at the Central Mill of the Eagle-Picher Mining & Smelting Co., having a capacity in excess of 12,000 tons of low grade lead-zinc ores, and utilizing galena as the heavy solid.

The Huntington-Heberlein process was developed at this time, also employing a galena medium and utilizing froth flotation as the means of medium recovery. Several installations were made in Europe to treat lead-zinc ores, and three in the United States, the two largest being those of Bunker Hill & Sullivan Mining & Concentrating Co. and the Hecla Mining Co. in Idaho. In this process, the galena is carefully sized by removing the middle-sized fraction and leaving only the coarse and very fine fractions so as to make it more stable. All currents in the separatory vessel are minimized.

In these plants the medium solid is substantially finer than the silica sand used in the Chance process or the barite used in the Barvoys process. This makes a much more stable medium and one that approaches a true heavy liquid in separating characteristics.

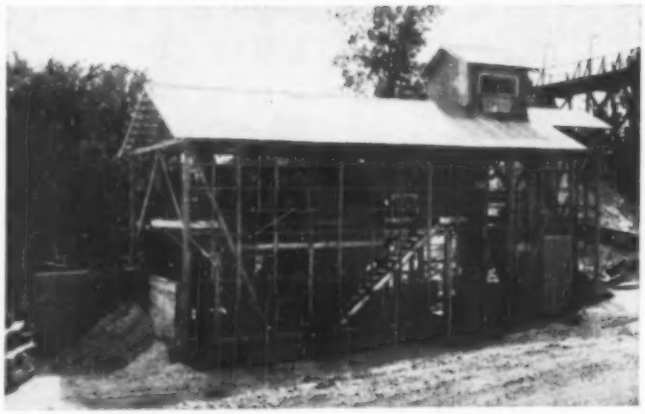
Following the successful use of galena as a medium solid by the Eagle-Picher Mining & Smelting Co., Heavy-Media separation was tried out in Minnesota iron ores by Butler Brothers. Difficulties in obtaining a sufficiently high medium gravity and in recovering the galena by flotation were

encountered. In order to make the process economic, it was necessary to find a better medium solid that could be recovered and cleaned with ease and one that is harder than galena. At this point, the use of an iron bearing material that could be recovered magnetically was considered. Iron filings were tried but were found unsuitable as they rust quickly. Ferrosilicon, a furnace product containing iron and silicon, was then tried and the grade containing 15 percent Si was found eminently suitable. It is cheaper and harder than galena, highly susceptible to recovery by magnetic separators and not subject to rusting.

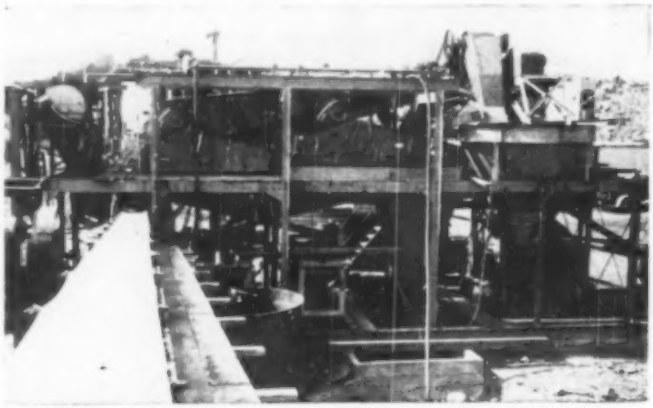
When the cleaned ferrosilicon was returned to the circuit after passing through the magnetic separators, it was then discovered that the medium lost its homogeneity and settled rapidly in the separatory vessel. On investigation, this was found due to the clumping together of the particles of ferrosilicon caused by the magnetic charge imparted by the magnetic separators. In order to overcome this, a novel method was conceived. The cleaned medium was passed through a demagnetizing coil which caused the particles to lose their magnetism and made it possible to maintain a dispersed medium in the separatory vessel. Furthermore, the agglomerating quality of the magnetized particles was turned to advantage by devising a magnetizing block, to precede the thickener that feeds the magnetic separators, through which the contaminated medium flows and which causes agglomeration and faster settling in the thickener. Thickeners of smaller diameter can, therefore, be used. A flowsheet of this circuit thus developed is described later in this paper.

As a result of this discovery, the Butler Brothers' unit was successfully converted to the use of ferrosilicon. Subsequently, seven more Heavy-Media separation plants were installed to concentrate iron ores in this country and Canada, all using ferrosilicon medium. This successful use of ferrosilicon on iron ores led to its use in the concentration of a variety of metallic and nonmetallic ores—lead-zinc, tin, garnet, fluorspar, magnesite, barite, spodumene and diamond ground. Today, out of a total of 35 sink-float plants employing ferrosilicon or galena mediums, all but eight use ferrosilicon and two of these are being converted to its use.

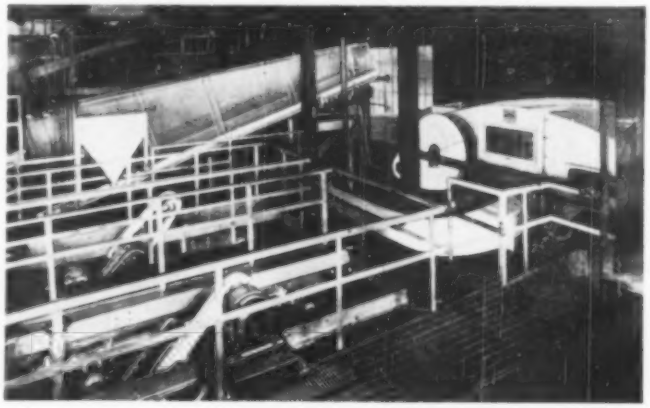
A clearer understanding of the basic principles of separation, and the method of recovery and cleaning of media can best be obtained by referring to the flowsheet shown in Fig. 1. This flowsheet is the one most com-



This 10-ton per hour fluorspar concentrating plant, operated by Inland Steel Co. at Rosiclare, Ill., is a Model 1M Mobil Mill, the smallest prefabricated type.



Western-Knapp Engineering Co.'s largest prefabricated type, the 4M Mobil Mill, is shown here at the Rhude & Fryberger iron ore operations at Ironton, Minn.



Coal cleaning is also an important use for sink-float concentration. Link-Belt Heavy Media equipment is used in a plant of Pittsburgh Coal Co., Champion, Pa.

monly used for treatment of sizes coarser than 10 mesh, using ferrous media. In Fig. 1 it will be noted that the finer sizes are removed from the feed by the primary washing screen (1) before the material enters the separatory cone (2). In the separatory cone (2), which is filled with ferrous medium of preselected gravity, the low-gravity minerals float on the surface of the medium and are removed by overflowing a weir located opposite the point of entry of feed. The heavier gravity minerals sinking through the medium are continuously removed from the cone by means of an air-lift (3).

The float and sink products discharged from the cone go to drainage and washing screens (4) and (5). In the particular flowsheet shown in Fig. 1, the float and sink products are treated on single drainage and washing screens divided longitudinally by a partition to keep the products separate. In large size plants, separate drainage and washing screens are provided to handle the float and sink products.

The purpose of the drainage screen (4) is, as the name implies, to drain off and remove the medium from the float and sink products. Normally, more than 90 percent of the medium discharged from the cone with the float and sink products drains off on the screen or screens mentioned, and is returned directly back to the cone (without further treatment) by means of one or more centrifugal pumps (6).

Meanwhile, the float and sink products pass along the drainage screen, or screens (4), to the washing screen, or screens (5), where substantially complete removal of the adhering medium is accomplished by means of water sprays as indicated in Fig. 1. The screen oversize products are then discharged as concentrate or tailing.

Positive and simple control of the desired cleanliness and separating efficiency of the medium removed by the drainage screens and circulated directly back to the separatory cone is provided by a readily adjustable diverting chute, located underneath the drainage and washing screens (4) and (5). By means of this chute, more or less medium may be diverted from the drainage hopper to the washing hopper and thence to the cleaning circuit.

Medium removed by washing is too dilute and, in many instances, too contaminated with fine impurities to permit of its being returned directly to the separatory vessel. Accordingly, it is treated in a novel manner as follows.

Undersize from the washing screen (5) first flows by gravity or is pumped to a medium reclamation thickener (8). Just before it enters the thickener the diluted medium passes between a set of magnetizing blocks (7). These last serve to change the charge on the discrete ferrosilicon or magnetite particles so that they become mutually attracted and flocculate. The net result of this is faster settling of the particles in the thickener, with the consequent advantage of requiring less thickener area and depth than would otherwise be necessary. Permanent magnets are used for this purpose but more recently electromagnets have been recommended because of the greater magnetic flux that they provide and the fact that they are not subject to a gradual loss in strength.

The overflow from the thickener (8) may be used for spray water as shown in Fig. 1. Alternatively, the overflow from this unit may be sent to another thickener which may serve as water storage and clarification means for the entire operation. In the latter event, a portion of the overflow from this secondary thickener would be used for spray water over the previously mentioned washing screen (5).

Besides dewatering the medium, the thickener (8) also provides storage for medium during off-operating periods. For this reason, this thickener is provided with a motorized device for raising and lowering the rakes. When the plant is shut down, the rakes are lifted to some point above the settled solids. When operations are resumed, the rakes are gradually lowered into the settled solids which are then rendered sufficiently mobile so that they may be eventually removed by means of a centrifugal pump (10) and sent to the cleaning circuit comprising at least two magnetic separators (11) and (12).

When it is desired to increase the specific gravity of the medium in the separatory cone during operation in order to meet some change in characteristics of feed, an extra amount of medium can readily be introduced into the circuit by lowering the rakes in the thickener.

Magnetic Cleaning

The magnetic cleaning circuit, as shown in Fig. 1, comprises a primary (11) and a secondary (12) Crockett-type magnetic separator. These separators are of the belt type, the magnet assembly being mounted just above the lower section of the belt. Feed is added under the belt as shown and the fines, not immediately picked up by the action of the magnets and carried by the rubber belt, are dropped and eliminated through the hopper, as shown. This tailing, or reject, goes by gravity to the secondary magnetic separator (12) for additional treatment in order to recover any traces of medium not picked up in the primary separator. The tailing from the secondary separator (12) goes to waste; or if sufficiently valuable, may be sent to some other form of cleaning, such as froth flotation.

Medium recovered on the belt of the primary magnetic separator (11) is discharged into the hopper, as shown in Fig. 1, after the belt passes the influence of the magnetic field. This recovered medium is too diluted with water to return directly to the separatory cone (2) and it is therefore treated in the following manner.

Concentrate produced by the primary magnetic separator flows by gravity, or it may be pumped, to a densifier (13). The densifier is essentially a screw-type classifier, but acts as a thickener and storage reservoir for clean medium. It is not a classifier in the accepted sense of the term. The machine must be fed at the end by means of a feed box, and overflows at the sides—just the opposite of a classifier. The screw is a double helix flight and is equipped with a variable speed drive. Either a manually operated or motorized lifting device is provided to raise or lower the screw as required.

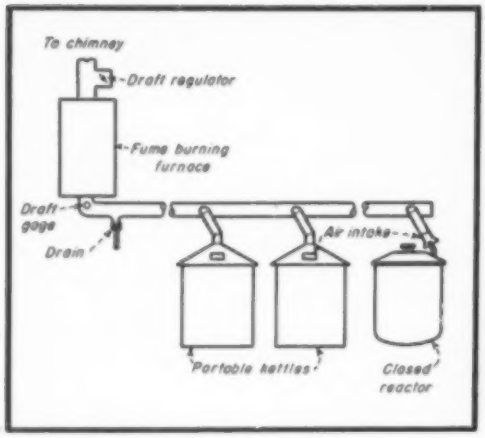
The densifier performs the important function of assisting in regulating the specific gravity of the medium in the separatory cone, in addition to dewatering the medium recovered by the magnetic separators.

Medium removed by the secondary magnetic separator (12) may join the flow of medium recovered by the primary separator (11). Alternatively, it may join the overflow of the densifier (13) which returns to thickener (8).

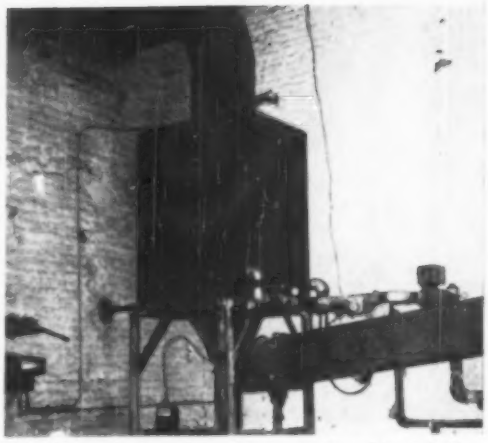
The screw discharge of the densifier returns by gravity to the separatory cone (2) via the drainage hopper and medium return pump (6). Before it reaches the drainage hopper, however, it passes through an alternating current demagnetizing coil (14) as shown in Fig. 1. This is an essential step in the Heavy-Media separation flowsheet. The dispersing effect of the demagnetizing coils gives fluidity to the medium in the separatory cone without which satisfactory operation could not be maintained.

As previously stated, the densifier (13) provides a means for ready adjustment of the specific gravity of the medium in the separatory cone. The medium discharged by the screw is of considerably higher specific gravity than the medium in the cone. Therefore, water may be added to the medium returned to the cone by the pump (6). Ordinarily, any required adjustment of specific gravity of me-

(Continued on page 114)



General plan for complete fume combustion system shows four major parts: covers, fume duct, furnace and chimney.



Specific applications of the plan are engineered for individual needs, as in this vertical unit used in a paint plant.

Fume Disposal by Combustion

Here, in a single operation that leaves no residue, is a new solution for an old problem: disposal of process fumes in paint, food and lithographing industries.

Joseph Jares
Industrial Engineer, Brooklyn Union Gas Co.
Brooklyn, N. Y.

GETTING rid of process fumes by combustion is possible in a new fume-disposal furnace developed by the Brooklyn Union Gas Co. Thus another solution is offered for an ever present problem of industry. The furnace has two distinct advantages: fumes are completely removed in a single operation; and no residue is left. While it is now being introduced in such industries as lithographing and food processing, the furnace was designed for and first used in paint and varnish plants.

The furnace came into being to lick the fume problem in paint and varnish plants. Heat processing of paint and varnish vehicles and also the baking of paint produce fully combustible fumes. These fumes have practically no recovery value. They can be destroyed cheaply and easily by combustion.

To get data on combustion properties of new synthetic oils and resins, a pilot-sized varnish-cooking and fume-disposal unit was designed and built. A large number of oils and varnish ingredients were processed in this unit (see Table I). Time and temperature cycles were rigidly adhered to. Many tests were made. Oils were bodied by heating at temperatures from 540 to 620 deg. F.; short, medium and long oil varnishes were processed; and both straight and oil-modified alkyds prepared. This work lasted more than two years. Throughout, experienced varnish makers were on hand.

These tests gave all essential data on combustion properties of fumes: total fume loss per batch; maximum fuming rates for specified heating cycles; fume ignition temperatures for each oil or varnish formulation; and draft requirements for conveying fume-gas mixtures through the disposal system.

Since they vary in chemical composition, oil and varnish fumes have characteristic ignition or combustion temperatures (which may change during the fuming period, just as composition of fumes and rate of fuming change during progressive stages of each cooking cycle). As a general rule, ignition temperatures become higher with an increase in water vapor and CO_2 content of fumes.

Fuming rates in Table II represent maximum rates of fuming during some period of the cooking cycle. They cannot be compared with the total fume loss of the specific materials for estimating purposes.

Fuming Rates

When a fume-disposal system is designed, the installation must be projected on carefully estimated quantities of fumes that may be produced at the same time by the various materials. Extra capacity must also be provided for abnormal conditions.

Normal fuming produces an expected quantity of fumes. Normal fuming takes place during uninter-

Table I—Materials Tested

Oils
Linseed oil (raw)
Linseed oil (refined)
Tung oil
Oiticica oil
Castor oil (dehydrated)
Fish oil
Alkyd Materials
Tall oil
Linseed fatty acids
Pentaerythritol
Mixed fatty acids
Phthalic anhydride
Glycerine
Rosin
Resins
Natural rosin
W-H-S-99 limed rosin
No. 254 Bakelite
No. 2175 Bakelite
No. 4036 Bakelite
No. 911 hydrocarbon
A-D-63 Velsicol
Pentalyn G
Amberol

Table II—Fuming Rates

Material	Fume Ignition Temperature, Deg. F.	Maximum Fuming Rate, Percent
Linseed oil (raw)	1,150	3.6
Linseed oil (refined)	1,130	2.7
Linseed and fish oils (50-50 mixture)	1,140	3.2
Z-3 linseed and Z-3 castor oils (50-50 mixture)	1,120	2.6
Alkyd—tall oil—pentaerythritol	1,380	9.5
Varnish formulations	980 to 1,160	2 to 6

Table III—Data on First Six Installations

Furnace No.	Burner Capacity, Cu. Ft.	Number of Kettles	Charge per Kettle, Lb.	Draft Range, In.
1	550	2	1,500	0.08 to 0.14
2	900	4	800	0.15 to 0.36
3	300	1	1,700	0.12 to 0.18
4	1,350	4	1,200	0.18 to 0.32
5	1,200	4	1,600	0.09 to 0.15
6	600	1	2,000	0.06 to 0.09

rupted processing of a batch according to its prescribed time-temperature schedule under constant conditions (mechanical stirring at uniform speed, steady flowing of air or inerts through the batch and introduction of added materials at uniform rate). Accidental overheating of a batch, sudden starting of an agitator, or an air blast while the batch is at high temperature cause abnormal fuming. Enough capacity must be provided in the equipment to handle such an unexpected extra fume load.

Equipment

A complete system of fume destruction by combustion consists of at least four pieces of equipment. First is a set of kettle covers designed to collect and confine the fumes so that they do not escape into the atmosphere. Second is the main fume duct with branch lines to the individual kettles. Third is the fume-burning furnace, which consists of a gas-fired fume-ignition zone and a fume-combustion zone. This latter zone is equipped with some additional radiating surfaces to insure complete combustion of any slow-burning or wet fumes. The fourth is either a natural-draft type chimney or an exhaust blower or an ejector system. Any one of these three exhaust systems may serve the purpose, which is to create the necessary draft or suction to convey the fume-air mixture from the kettles through the furnace and release the spent flue gases into the atmosphere.

Draft requirements depend entirely on the number and size of kettles served by the system. Laboratory tests on oil and varnish formulations were conducted at −0.05 in. draft and alkyd batches were processed at −0.08 in. draft, as measured at the inlet side of the furnace. The slightly higher draft is desirable for faster removal of water vapor produced by the alkyd reactions. Operating data for the first six industrial installations are listed in Table III.

A −0.05-in. draft may be considered a perfectly safe minimum; it will insure more than ample dilution of fumes with air, thus keeping the fume-air mixture well below the lower limits of flammability. To provide for potential abnormal fuming of untested materials, a draft range from −0.10 in. to 0.25 in. on new installations is recommended.

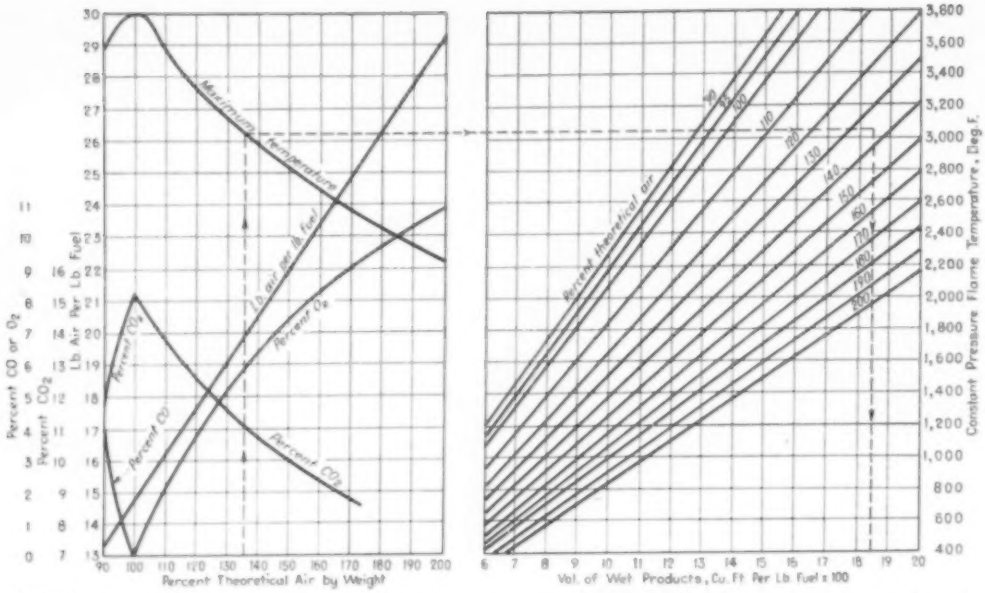
Gas consumption of a fume furnace depends on design, rated fume capacity and draft conditions of the system. A correctly proportioned and well insulated furnace requires a fuel-gas input between 600 and 1,200 Btu. per hr. per gal. of processed batch.

Each proposed installation must be engineered to meet specific plant conditions. Furnace capacities may be standardized in terms of pounds of fumes per hour, but design of furnace structure may require individual treatment. Thus when space is limited a vertical furnace may be an integral part of the chimney; a horizontal furnace may be designed for straight-line continuation of the duct system. Also, the relative location or grouping of the kettles and how often they are used have a lot to do with how the load on the fume-burning furnace is divided. While gas-fuel costs are the major operating expense, the gas input of a furnace is proportioned to its maximum fume capacity and so it remains practically constant no matter how many kettles are in service. One large furnace may be costly to operate when the fume load is small; two or more small furnaces may bring savings in fuel. As a rule, fuel costs compare favorably with operating costs of other fume-disposal systems. Certain refinements, now under observation, are expected to show substantial fuel savings. For example, on a recent installation a temperature controller is used to restrict the gas input during the high fuming periods, and the heat generated by combustion of the fumes maintains the furnace at the required temperature. Fuel savings up to 80 percent of the rated burner capacity are thus accomplished by this means. The possibilities of waste-heat recovery for other plant uses are being investigated.

New Uses

While the fume-disposal furnace was originally designed for use in the paint and varnish industry, it has found application in other fields. Thus two plants doing tinplate lithographing are now using the fume-disposal system. A similar installation takes care of four smokehouses in a fish-smoking plant. And right now the furnace is being considered for the burning of coffee chaff in a roasting plant.

The fume-disposal furnace offers one way of licking the air-pollution problem. The system has this distinct advantage: volatile fume constituents are completely removed in one operation, leaving no residue for subsequent disposal. Companies using this system report that it has solved their problems successfully.


Maximum temperature
Lb. air per lb. fuel
Percent O2
Percent CO2
Percent CO
Percent CO2
Percent CO or O2
Lb Air Per Lb Fuel
Percent Theoretical Air by Weight
Percent theoretical air
Constant Pressure Flame Temperature, Deg. F.
Vol. of Wet Products, Cu. Ft. Per Lb. Fuel x 100

COMBUSTION VOLUME, flame temperature and other quantities are readily determined from this chart based on No. 3 fuel oil.

Computing Combustion Volumes For Burning Oil Fuel

Combustion volume for oil fuel depends markedly on degree of atomization, a fact shown clearly in this new method of computing the volume required.

Ralph Gibbs
Consulting Chemical Engineer
York, Pa.

According to authorities in the combustion field, the computation of combustion, or flame, volumes is too involved to predict. Griswold[1] states that "The size of an oil flame depends upon the heat liberation and class of fuel, the type of burner, the degree of atomization, the atomizing fluid if any, and the turbulence of the air-fuel mixture. No general correlation is available to predict flame size."

Haslam and Russell[2] state: "From 1.75 to 2.0 lb. of oil can be efficiently fired per cubic foot of combustion space." They make no effort to develop a method to compute combustion volume.

The first of these references frankly admits the unavailability of any correlation. Experience has shown that the rule-of-thumb relation given in the second reference is extravagantly conservative in providing ample combustion volume to allow for the uncertainties of atomization.

Today, especially in domestic and packaged industrial oil-burning heating and steam-generating equipment, the trend is toward compactness, with the heat transfer surfaces so arranged as to be highly effective. Heat releases in excess of 150,000 Btu. per hour per cubic foot of combustion space are now common, and it appears feasible to increase this heat release five, and possibly even ten-fold. Heat releases in jet engines, for example, are enormous.

The Combustion Process

It must be granted that the combustion process is one of great complexity, and liable to stagger one by its multiplicity of variables. It is worthy of all the study accorded it, and more.

For our present purpose, however, the writer believes much more can be accomplished by simplifying, rather than by complicating, the problem. Let us consider the combustion process for oil fuel in the simplest manner possible, and assume that any practical mixture of the fuel vapor and air is so intimate they will react at a rate greater than that at which the oil is vaporized.

Thus the limiting factor for the combustion rate will be the rate of oil vaporization.

The combustion equation then becomes:

Heat + Oil + Air → Products of Combustion + Heat

The elements to the right of the arrow can be considered as a certain quantity of material, substantially all gases, at an elevated temperature and occupying a volume corresponding to the temperature. The temperature and volume, of course, will depend on the composition of the fuel and the quantity of air used in the process. Knowing these values, however, it is possible to compute with a high degree of accuracy the flame temperature and the corresponding volume of the gases.

A combustion data chart for a domestic grade of oil appears on page 112. Similar charts can be developed for any grade of fuel oil. From this chart the flame temperature and volume of the combustion products can be determined for any practical range of air quantities. It is of prime importance to our present purpose to determine the volume of the combustion products formed per hour at the maximum temperature. The basis for this volume will be some arbitrary fuel quantity rate, either pounds or gallons per hour, or even the total firing capacity per hour. For general engineering purposes, it is more convenient to base the computation on a fuel rate of 1 gph.

Heat Available

To be burned at practical rates for the development of heat, fuel oils must be converted from the liquid to the vapor state. The element of heat to the left of the arrow in the combustion equation above represents the heat necessary to convert the liquid fuel to vapor.

With the establishment of the flame, a certain quantity of the flame's heat is available to vaporize the oil being introduced into the process. No doubt this heat, in the case of atomized oil, is transferred predominantly by radiation, and the ordinary radiation heat transfer relations should therefore be applicable.

For heat transmission in this way Stoever[3] gives the coefficient as:

$$h_r = \frac{0.173 \times 10^{-8} \times (T_1^4 - T_2^4)}{t_1 - t_2} \qquad (1)$$

where h_r = heat transmitted in Btu. per hr. and sq. ft. per deg. F. of temperature difference; T_1 = temperature of the hotter body, deg. F. abs.; T_2 = temperature of the cooler body, deg. F. abs.; t_1 = temperature of the hotter body, deg. F.; and t_2 = temperature of the cooler body, deg. F.

This coefficient must be modified by the use of a suitable position factor and emission and absorption coefficients before it can be applied.

Although the area of the flame surface that will provide the radiant heat is not known, it is now important to know only that this heat is available.

Heat Required

In order to vaporize the oil, it is necessary to supply the sensible heat required to bring the oil to the vaporizing temperature, and also that required to vaporize the oil. An oil similar to that used to compute the combustion data chart will have a latent heat of vaporization of about 110 Btu. per lb., and a specific heat of nearly 0.5. Also, the distillation end point will be close to 650 deg. F., and the initial boiling point approximately 150 deg. F. Thus the average boiling point will be about 400 deg. F.

For each pound of oil at 70 deg. F. it will be necessary to supply for vaporization 110 + (1 × 0.5 × 330 deg. F.) = 275 Btu. per lb. and for each gallon of this oil, 275 × 7.08 = 1,945 Btu. per gal. On a gallon-per-hour basis, heat must be supplied to the oil at a rate of 1,945 Btu. per hr.

Oil Surface

Although most fuel oil burned in most domestic and industrial oil-burning equipment is atomized, the importance in furnace design of knowing the degree of atomization is not generally realized. Data of this kind are extremely scarce, and the manufacturers of oil atomizing nozzles do not provide this information. It is hoped that before too long, nozzles of this sort will carry with them data on their atomizing characteristics as well as their capacities.

It is somewhat surprising that more work on the distribution of particle sizes produced by nozzles operating on different liquids under different operating conditions has not been obtained. In connection with work done for the Office of Scientific Research and Development at the University of Illinois and published by the Office of Technical Services,[4] reference was made to most of the work previously done, with particular reference to that of Nukiyama and Tanasawa[5] and it was found possible to prepare correlations of existing experimental data. However, the equations presented are difficult to use and require the employment of a limited amount of experimental data, so in the absence of something better certain data of Houghton from Perry's Handbook[6] will be used in these computations.

In order to show the effects of the degree of atomization on the flame or combustion volume, data on a coarse spray and a fine spray will be used. A condensation of Houghton's data on particle size distribution is given in Table I for a coarse spray, and in Table II for a fine spray.

Table I—Coarse Particles, Total Volume = 0.524 × 10⁻⁶ Cc.

Nominal Drop Diameter, Microns	No. of Particles	Surface of Particles, Sq. In.
10	100	0.49 × 10⁻⁶
25	50	0.15 × 10⁻⁶
50	45	0.53 × 10⁻⁶
100	27	1.32 × 10⁻⁶
150	15	1.65 × 10⁻⁶
200	11	2.11 × 10⁻⁶
300	6	2.58 × 10⁻⁶
400	3	2.19 × 10⁻⁶
500	2	2.36 × 10⁻⁶
Total.....		13.38 × 10⁻⁶

$$\frac{16.4 \times 13.38 \times 10^{-6}}{0.524 \times 10^{-6} \times 144} = 1.52 \text{ sq. ft. of surface per cu. in.}$$

1.52 × 231 = 346 sq. ft. per gal. of oil.

Table II—Fine Particles, Total Volume = 0.524 × 10⁻⁶ Cc.

Nominal Drop Diameter, Microns	No. of Particles	Surface of Particles Sq. In.
2	3.9 × 10⁶	7.60 × 10⁻⁶
5	3.4 × 10⁶	40.10 × 10⁻⁶
10	1.65 × 10⁶	80.50 × 10⁻⁶
15	4.02 × 10⁵	42.60 × 10⁻⁶
20	1.17 × 10⁵	22.40 × 10⁻⁶
25	4.97 × 10⁴	15.20 × 10⁻⁶
30	2.16 × 10⁴	9.30 × 10⁻⁶
35	1.73 × 10³	10.20 × 10⁻⁶
40	1.08 × 10³	7.60 × 10⁻⁶
45	6.50 × 10²	6.30 × 10⁻⁶
50	4.30 × 10²	5.08 × 10⁻⁶
60	3.50 × 10¹	6.13 × 10⁻⁶
70	2.20 × 10¹	5.22 × 10⁻⁶
Total.....		258.23 × 10⁻⁶

$$\frac{16.4 \times 258.23 \times 10^{-6}}{0.524 \times 10^{-6} \times 144} = 56.2 \text{ sq. ft. of surface per cu. in.}$$

56.2 × 231 = 13,000 sq. ft. per gal. of oil.

With water-cooled walls in the furnace and only the heat in the flame to vaporize the oil, the effective area of each spherical particle receiving radiant energy is only one-fourth of the total surface area of the particles, or $A_{eff.} = 0.25A$, where A is the total area calculated in the tables.

Temperatures and Heat Transfer

With the oil particles entering the combustion space at 70 deg. F. and with the flame temperature established by the combustion data chart, the following relations can be made.

$$H_r = 275 \times W_g \qquad (2)$$

$$H_a = h_r \times A_{eff.} \times (t_1 - t_2) \times e_1 \times e_2 \qquad (3)$$

where H_r = Heat in Btu. required per hour to vaporize 1 gal. of oil; W_g = weight of oil in lb. per gal.; H_a = heat available, in Btu. per hr.; h_r = the coefficient of radiant heat transfer from

Eq. (1); and e_c and e_g = emission and absorption coefficients.

The ratio of the heat requirement rate H_r to the heat available rate H_a will give a result in terms of time, that is, the part of an hour needed to provide the heat required to vaporize the oil supplied in 1 hr.

Combustion Volume

Knowing the time rate of combustion products volume formation, and knowing the time required to vaporize 1 gal. of the oil, the product of these quantities results in terms of volume, or:

$$(H_r \times V_c) / H_a = V_p \qquad (4)$$

where V_p = the volume of combustion products per hr. per gal. of oil, at flame temperature; and V_c = the volume of the combustion reaction, i.e., the flame volume. Substituting the equivalents for H_r and H_a, then:

$$V_c = \frac{V_p \times 275 \times W_c}{0.173 \times 10^{-8} \times (T_c^4 - T_a^4) \times 0.25 A e_c e_g} \qquad (5)$$

If we attribute justifiably the luminosity of the flame to incandescent carbon particles, then e_c will be 0.95, and for oil a value of 0.82 for e_g is indicated. The coefficient of the last denominator term in Eq. (5) then becomes $0.25A \times 0.95 \times 0.82 = 0.195A$.

A Numerical Case

What will be the combustion volumes when burning oil of the characteristics shown on the combustion chart when 135 percent of theoretical air is used with: (1) a coarse and (2) a fine atomization?

From the chart, it will be seen that with this oil 135 percent of theoretical air will produce a combustion product containing 11 percent CO_2. The maximum flame temperature is indicated as 3,060 deg. F., and the volume of the combustion products will be 1,850 cu. ft. at 3,060 deg. F. for each pound of oil fired. Then $V_p = 1,850 \times 7.08 = 13,100$ cu. ft. per gal. per hr.; $T_c = 3,060 + 460 = 3,520$ deg. F. abs.; $T_a = 70 + 460 = 530$ deg. F. abs.; and $(T_c^4 - T_a^4) = 154 \times 10^{12}$.

Then, for coarse atomization (from Eq. 5):

$$V_c = \frac{13,100 \times 275 \times 7.08}{0.173 \times 10^{-8} \times 154 \times 10^{12} \times 0.195 \times 346} = 1.42 \text{ cu. ft}$$

With coarse atomization, it appears that 1.42 cu. ft. of combustion space must be provided for each gallon per hour of oil fired. For fine atomization the indicated surface area of 13,000 sq. ft. is 37.6 times as great as for coarse atomization, so that V_c becomes $1.42/37.6 = 0.0378$ cu. ft. of combustion space per gallon of oil per hour.

With fine atomization it is undoubtedly possible to approach heat releases of this order. With hot walls to assist in the radiation of heat, no doubt the heat releases can be still further increased. This result indicates that 1 gph. of finely atomized oil can be burned in a volume approaching 65.6 cu. in., at about atmospheric pressure.

In Conclusion

Results derived from the empirical relations developed here appear highly practical in the light of modern combustion practices with fuel oil. Furthermore, these relations may be of some value in guiding further work in combustion techniques.

Nothing has been said about the shape of the combustion chamber, since it is obvious that the form of the combustion volume must conform to the chamber, or vice versa.

The importance of suitable atomization is well demonstrated, and it is hoped that atomizing nozzle manufacturers will soon provide data permitting better design of furnace cavities.

References

1. Griswold, John, "Fuels, Combustion and Furnaces," McGraw-Hill Book Co., Inc., New York, 1946, p. 360.
2. Haslam and Russell, "Fuels and Their Combustion," McGraw-Hill Book Co., Inc., New York, 1926, p. 475.
3. Stoever, H. G., "Applied Heat Transmission," McGraw-Hill Book Co., Inc., New York, 1941, p. 36.
4. Available initially in photostat form from OTS. Later published by the authors, Lewis, Edwards, Goglia, Rice and Smith in *Ind. Eng. Chem.*, **40**, 67 (1948).
5. Nukiyama, S., and Tanasawa, Y., *Trans. Soc. Mech. Engrs.* (Japan), **4**, 86, 138 (1938); **5**, 62, 68 (1939); **6**, II-7, II-8 (1940).
6. Houghton, G. H., in Perry's "Chemical Engineers' Handbook," McGraw-Hill Book Co., Inc., New York, 2nd Ed., 1941, pp. 1991-92.

Sink-Float Processes

(*Continued from page* 109)

dium in the cone is most quickly and easily done by simply turning a valve to regulate the flow of water.

A bucket elevator, not shown in Fig. 1, is used to introduce new medium into the circuit, and is also used as a means of returning any clean-up material from floor washing to the system. When necessary to dump the separatory unit, this elevator is used to return the medium, as well as the inter-mixed ore, to the circuit. In some plants a pump is used to advantage instead of an elevator.

Coal Preparation

Although most of the early sink-float methods were developed for use in coal cleaning plants, it was not until the efficiency of magnetic mediums had been established in the treatment of ores that further progress was made in coal preparation. The first Heavy-Media separation unit to clean coal began operation in February 1945. The medium cleaning circuit follows that shown in Fig. 1, but in two major respects this plant differs from its predecessors. Since the air-lift used for the removal of sink is restricted to about 3-in. pieces, a different type of vessel was required for handling the large coal. A special drum type of vessel was developed and built by the Link-Belt Co. for this purpose. This is illustrated in Fig. 2.

Raw coal is fed into one end of the horizontal drum which is half submerged in the medium. The cleaned coal floats through the drum and overflows the weir. The heavy, high-ash refuse sinks to the bottom of the 12-ft. drum and is elevated by lifters attached to the inside surface of the drum as it turns slowly (1 rpm.). When the lifters near the top of their cycle the refuse drops from them on to a chute which conveys it to the drainage screen. The floating coal is prevented from being caught by the rising lifters by skirt boards extending a short distance below the surface of the medium. By using this type of separatory vessel there is no limit to the size of coal that can be cleaned. Hand picking of large coal sizes is no longer necessary, with a consequent saving in labor costs and in salable coal recovered.

Another way in which this operation differs from that used for ores is the medium employed—finely ground magnetite. Magnetite is highly magnetic, heavy enough to yield any gravity required in coal cleaning (1.25 to 2.50) and is a fraction of the cost of ferrosilicon. It is somewhat easier to handle because of its lower specific gravity. It is more finely ground than the other medium solids mentioned (75 to 85 percent minus 325 mesh) and, for this reason, produces a more stable medium. The fine size also reduces wear on the equipment.

Magnetite can be used as a medium solid for the separation of other low-gravity minerals such as gypsum, potash ores and concrete aggregate. The last named material is to be treated by Heavy-Media separation in order to eliminate low gravity particles that weaken the concrete. If this attempt proves successful, as seems probable, it will make possible the use of local aggregates in construction work which in some areas have been rejected because of inferior quality. This will re-

Completeness of Coal Cleaning by Heavy-Media Separation as Compared With Heavy Liquid Separation

Test	Sp. Gr. of Separation	Heavy-Media Separation — Clean Coal, % Wt.	Clean Coal, % Ash	Clean Coal, % S	Refuse, % Wt.	Refuse, % Ash	Refuse, % S	Heavy-Liquid Sep. — Float, % Wt.	Float, % Ash	Float, % S
1	1.40	83.1	6.6	0.97	16.9	47.4	3.49	84.2	7.2	1.02
2	1.45	87.3	7.4	0.97	12.7	54.8	4.05	86.7	7.80	1.13
3	1.50	90.1	8.0	1.12	10.9	59.7	4.04	89.4	7.9	1.46

sult in freight savings that far outweigh the cost of Heavy-Media separation treatment.

Standard Equipment

Equipment used in sink-float processes is, with few exceptions, standard milling machinery. Screens, pumps, thickeners, elevators, magnetic separators, flotation machines have all been borrowed from older concentration methods. Only the separatory vessels are of new design and (in the case of Heavy-Media separation units) the densifier, which is essentially a screw classifier with minor changes. In the design of separatory vessels it is necessary to provide a suitable means for removing the sink product and to allow for medium replacement without causing undesirable surface currents. Cone or pyramidal shaped vessels have proven successful, as well as the drum type described above. Another type that has been used with excellent results on the Minnesota iron ores was developed by the Colorado Iron Works Co. This unit, illustrated in Fig. 3, resembles a screw classifier. The medium is contained in the classifier tank and the ore is introduced at what is normally the overflow end. The light fraction of the ore overflows a weir at the side of the tank and the sink is elevated by the screw to the rake product end of the tank. Medium is returned with the feed. This separator can handle sizes larger than can be removed by an air lift. It also requires less headroom than a cone separator, and a smaller volume of medium circulation, since little medium is removed from the vessel with the sink product.

In order to meet a demand for small capacity sink-float units, the Western-Knapp Engineering Co. has designed prefabricated Heavy-Media separation units having capacities ranging from 10 tons per hr. to 25 tons per hr. These units are shipped in sections complete with supporting steel, piping and wiring and can be easily assembled on the job. Fig. 4 illustrates this unit, known as the Mobil Mill. Eight of these units have been installed to treat both ores and coal.

Operating Results

To illustrate the kind of performance that can be obtained with sink-float methods applied to coal the accompanying table is presented. These figures show how close to a perfect separation, as indicated by the heavy liquid results, it is possible to come. In the Heavy-Media separation coal cleaning unit described above, the operating company reports that less than 1 percent of the float reports in the sink product, and less than 1 percent of the sink reports in the float product.

Medium solids consumption depends on the type of medium employed, method of recovery, and type of material being treated. In a number of plants consumption runs as low as 0.25 lb. per ton of feed to the unit while, under less favorable conditions, it may be as high as 1.0 lb. per ton. Water consumption may be expected to amount to 5 or 6 gpm. of water per ton per hr. of feed but if water is scarce and an adequate water recovery system is employed, it can be reduced to 1½ to 2 gpm. per ton per hr. Power requirements range from a low of approximately 1 hp.-hr. per ton of feed for large installations, to a high of 2.0 to 2.5 for units of low capacity.

Labor requirements are very low. The equipment is largely automatic and, aside from equipment maintenance, the operator has little to do except to take periodic samples of the medium to check the gravity. At some plants automatic gravity recorders have been installed so that a constant check on the gravity of separation is maintained. At one plant, 60 hand pickers were eliminated by the installation of a Heavy-Media separation unit operated by two men a shift, with the help of a maintenance man on one shift.

Capacities of sink-float plants are high as the separation of sink from float takes place in a few seconds. A unit equipped with a 7-ft. diameter cone separatory vessel can treat in excess of 600 tons of feed in a 24-hr. day.

Field of Application

In order to be amenable to sink-float treatment, an ore must, on crushing, break into fragments that have sufficient differences in mineral content to cause a difference in specific gravity between the valuable pieces and those too low in valuable mineral content to justify further treatment. Those that require crushing finer than ¼ in. in order to obtain this difference in specific gravity are generally not suited, as the lowest size of ore treated is 14 mesh. As this size is approached by the crusher, the percentage of the ore that can be treated becomes too small to make use of these methods attractive. The extremely accurate gravity separation that can be made by these methods does, however, make a wide range of ores amenable.

Such ores may be treated to produce directly salable products and discardable waste, or they may be separated into discardable waste products and enriched products that are to be treated by other methods after reduction in size. Because of low capital cost and cost of operation, sink-float plants can be used to grade up submarginal ores to the point where they can be treated profitably. Waste dumps and coarse tailings from less efficient concentration methods can be treated. Cheaper, less selective mining methods can be used and the waste discarded prior to concentration by older, conventional methods. Thus, large new reserves of mineral resources are, in effect, created by new methods of concentration.

Although many ores cannot be treated by sink-float methods, practically every coal can be cleaned by one or more of these processes. This fact becomes increasingly important as the better seams of coal are exhausted and it becomes necessary to use lower grade coals more difficult to clean. The increasing use of mechanized mining and full-seam mining throws a greater burden on the cleaning plant because of the larger and more variable quantity of refuse in the coal. Heavy-Media separation is ideally suited to this service because of the ease with which a constant medium gravity can be maintained under adverse conditions, and the ability of the equipment to remove the sink product continuously. Eight plants employing Heavy-Media separation processes are now built or under construction for cleaning anthracite and bituminous coals. This field offers great scope to sink-float methods.

Although commercial sink-float installations have been restricted to the treatment of material coarser than 10 to 14 mesh, pilot plant studies made at the mineral dressing laboratory of American Cyanamid Co. indicate the possibility of making good gravity separations on particles as fine as 48 mesh in the case of ores and as fine as 100 mesh in the case of coal. This development will help to close the gap between gravity methods of concentration and froth flotation, the most efficient method of concentrating fine ores and coal.

PERCHLORIC ACID FIRES

E. M. Harris

Engineer, Associated Factory Mutual Fire Insurance Companies, Boston, Mass.

Their Effect. It was death and destruction in this case, the much publicized Los Angeles explosion in 1947. Toll: 15 killed, 400 injured—all unnecessary.

Above is the smoking aftermath of an explosion which damaged buildings in a 12-block area in Los Angeles in 1947; it attracted wide attention to the hazards of using perchloric acid. The process at which the explosion originated involved approximately 300 gal. of a mixture of perchloric acid and acetic anhydride, and had been installed and operated with inadequate regard for the safety of the process.

The first loss involving perchloric acid in a plant insured in the Factory Mutual Companies was reported in 1936. Since that time there have been eleven reported fires or explosions. Typical of these was a violent explosion in the exhaust duct from a laboratory hood, in which perchloric acid solution was being fumed over a gas plate. It blew out windows, bulged the exterior walls, lifted the roof, and extensively damaged equipment and supplies. Some time prior to the explosion, the hood had been used for the analysis of miscellaneous materials. The explosion apparently originated in deposits of perchloric acid and organic material in the hood and duct.

Another explosion occurred while a chemist was drying alcohol off a small anode over a bunsen burner in a hood reserved for tests involving perchloric acid. The explosion tore the exhaust duct from the hood, bent a portion of the ductwork near the fan, and blew out many panes of window glass.

At another plant, an employee dropped a 7-lb. bottle of perchloric acid solution on a concrete floor. The liquid was taken up with sawdust and placed in a covered, metal waste can. Four hours later, a light explosion blew open the hinged cover of the can. A flash fire opened three sprinklers which promptly extinguished the fire.

At still another plant, a 7-lb. bottle of perchloric acid solution broke while an employee was unpacking a case containing three bottles. The spilled acid instantly set the wood floor on fire, but it was put out quickly with a soda-acid extinguisher.

At a malleable iron foundry, perchloric acid had been used for about four years in the laboratory for the determination of the silicon content of iron samples. A cast iron, wash sink drain at the bench used for this purpose had corroded and the leaking acid had soaked into the wood flooring, which was later ignited while a lead joint was being poured. This fire was extinguished and part of the wood flooring was removed. Later in the day, at a point slightly removed from the location of the first fire, a similar fire occurred when hot lead was again spilled. This time the fire flashed with explosive violence into the exhaust hood and stack above the work bench. Laboratory equipment and records were extensively wet down and damaged.

Characteristics of Solutions

Anhydrous perchloric acid itself is very hazardous. Difficulties encountered with perchloric acid solutions are due to formation of the anhydrous acid or its derivatives. The anhydrous form as such has no industrial uses, and for all practical purposes is produced only by accident. If allowed to stand at room temperature, the anhydrous acid gradually darkens and finally explodes spontaneously. Contact with oxidizable material at once produces violent explosions. Its stability can not be materially increased unless stored at a very low temperature (−235 deg. F.) such as is obtainable with liquid air.

Commercially, perchloric acid is distributed and used either as a 60 or a 70-72 percent solution of perchloric acid in water, by weight. The Interstate Commerce Commission classifies perchloric acid solutions as corrosive liquids, and shipment of concentrations in excess of 72 percent is not permitted. ICC regulations regarding loading, handling and labeling of corrosive liquids must be followed, and each package must bear a white ICC Acid Label. The usual containers are glass bottles holding ½ lb., 1 lb., and 7 lb., and boxed carboys containing 6½ or 13 gal.

If the 60 percent solution is heated, water will be driven off until the perchloric acid concentration reaches 72½ percent at a constant boiling point of 397 deg. F. The 60 percent solution has a specific gravity of 1.55 at room temperature; the 70-72 percent solution, approximately 1.70. Tests by the Factory Mutual Laboratories showed that neither the 60 nor the 70-72 percent commercial solutions would freeze when the temperature was reduced to −45 deg. F. The solutions are odorless, water-white liquids.

At ordinary temperatures 72 percent perchloric acid reacts as a strong non-oxidizing acid. At elevated temperatures (approximately 320 deg. F.), it is an exceedingly strong and active oxidizing agent, as well as a strong dehydrating agent. Contact with combustible material at elevated

Well-substantiated reports show that perchloric acid fires or explosions have been caused in the following ways.

1. The digestion of samples with the acid in laboratory fume hoods used for general purpose work in which deposits of organic material were allowed to accumulate.

2. Spillage on porous material, such as sawdust and rags, which later ignited and/or exploded.

3. The contact of hot, concentrated perchloric acid solution with organic material. Materials such as the various alcohols and cellulose are reported to be particularly dangerous.

4. The mixing of perchloric acid solution and strong dehydrating agents, such as acetic anhydride and sulphuric acid. The Los Angeles disaster was due either to the failure of the cooling system at a large operation of this type, or to the presence of an organic material in the vat, or both.

Their Cause. **It generally gets back either to contact with organic material or to accidental formation of the anhydrous acid. Article tells how to prevent both.**

temperatures may cause fires or explosions. Perchloric acid has available some free oxygen, and the extent to which the acid will give up its oxygen is a function of the concentration and the temperature. Its solvent power when hot and concentrated is extremely valuable in the digestion of samples of materials such as stainless steel, refractory oxides, ores and minerals. A hot and concentrated solution containing a mixture of phosphoric and perchloric acids will dissolve metallic tungsten. Some analytical procedures require mixtures of perchloric acid and acetic anhydride or concentrated sulphuric acid. Procedures of this type should be used only with the utmost precautions.

Hazards of Use

Various reasons have been advanced to explain fires and explosions involving perchloric acid solutions. Generally these explosions have been traced to contamination of the acid by organic material or to the formation of the anhydrous acid. Strong dehydrating agents such as sulphuric acid can convert an aqueous perchloric acid to the anhydrous acid under certain conditions.

It is not always possible to determine the exact conditions under which perchloric acid solutions are dangerous. As a minimum precaution, any new procedure or test using perchloric acid should be considered hazardous until the contrary is definitely established. Workers should be given specific warning of the possibilities of violent reactions if prescribed procedures are not closely followed.

The possibilities of danger suggest the following precautions in handling perchloric acid solutions in laboratory work:

1. Maintain the quantity of acid in the practical minimum. A liquid ounce will usually suffice for a single analysis. The 1-lb. bottle is advised for easy handling, and only the amount needed for current work should be allowed in the laboratory working area. Several 1-lb. bottles or two 7-lb. bottles would be considered the maximum advisable storage inside a main or laboratory building. Keep active bottles in a glass or ceramic dish large enough to hold the contents of the bottle. Store bottles not in active use in a non-combustible cabinet away from other combustible materials and chemicals.

2. Reactions involving perchloric acid should be carried out in metal or stoneware hoods, left unpainted or protected with inorganic coatings such as porcelain. A desirable type of hood has water spray nozzles with which the hood may be washed down after exposure to perchloric acid fumes. Otherwise, a separate hood should be reserved for analyses requiring perchloric acid. Ducts should not be manifolded and should take the shortest and most direct path to out-of-doors. An electric hot plate or heating jacket, a steam bath, or a sand bath should be used for heating reaction vessels; do not use gas flames and oil baths.

3. A generous supply of water-type extinguishers should be provided.

4. Handle bottles carefully to avoid spillage. If a spill occurs, flush it immediately with large quantities of water.

5. Perchloric acid should be used only in standard, analytical procedures from well recognized analytical texts. It should not be mixed with organic material. If organic material is present, it can ordinarily be pre-oxidized with nitric acid before perchloric acid is used. If dehydrating agents such as acetic anhydride are mixed with perchloric acid, extreme care is necessary. Operators should give attention to all the usual safety precautions.

6. Perchloric acid beyond immediate requirements should be stored in a detached, isolated building, away from combustible materials. For small quantities, an ordinary garbage can buried with the top projecting above the earth will provide good storage if other satisfactory arrangements cannot be made. A tight wooden box inverted over the can will provide adequate protection against temperature extremes. A suitable sign should be posted to give warning that the storage is not to be disturbed.

Quantity Handling

The following precautions are suggested for storing and handling perchloric acid solutions in quantity.

1. Store in a detached, non-combustible building containing no combustible materials or other chemicals.

2. Store carboys preferably on a raised steel track mounted on the floor, which should be of acid-resisting brick, concrete treated with sodium silicate, or steel. Provide suitable drainage facilities, and a hose connection for diluting leakage or spills.

3. Outfit operators with personal safety equipment, including rubber gloves, rubber sleeves, a rubber apron, and boots. Eye shields or goggles should be provided for face protection.

4. A location used for dispensing perchloric acid from large containers into smaller containers should preferably be cut off from other occupancies, with no combustible material permitted in the area. Only minimum practical quantities based on daily requirements should be retained in the dispensing area. A drained, non-combustible floor of concrete or metal should be provided, with water connections readily available for flushing away spilled acid.

5. Examine bulk storage at approximately monthly intervals. To dispose of acid that has become contaminated and discolored, pour into approximately ten times its volume of cold water in a porcelain or glass vessel. Stir, pour down the acid sewer, and flush. Large quantities of water should always be used to insure thorough flushing and dilution of the acid.

EDITORIAL VIEWPOINTS

Sidney D. Kirkpatrick and Staff

Democratizing Management

WITHIN the past few months two well-known and respected companies in the chemical engineering field have initiated plans to interest their employees in the profit side of these business enterprises. By making it possible for key workers to purchase stock not otherwise available or below its market price, these companies are accomplishing two worthwhile objectives. They provide incentives that encourage both thrift and efficiency. Equally important from the company standpoint is the sharing of management with those most concerned with the future conduct of the business.

As spokesman for the Dow Chemical Co., its president, Dr. Willard H. Dow, has said, "The predominating objective of our plan is to promote employee ownership as we believe that employees who are also stockholders make more loyal and efficient workers." Under this plan, members of the Dow staff, in accordance with their years of service, were permitted to buy 105,176 shares at $44.31 a share, which is several dollars below the market price. Obviously, the amount of equity capital to be raised in this way was relatively insignificant as compared with other sources of financing. But the real gain is by promoting sounder relations between the company and its employees.

In the case of the Dorr Co. there was still another objective in mind. Writing in a recent issue of his company's house organ, the new chairman of the board, Dr. John Van Nostrand Dorr, said, "Among a number of forward-looking things done—I feel the most important—has been what we might call 'mass action by the stockholders' to provide for a so-called 'tenure stock.' This has been offered for subscription to fifty members of the staff to be held by them during their association with our company up to retirement age."

This step, Dr. Dorr states, has bound the key members of the staff even more closely than before to the company in which they have invested their professional lives. It has given them a greater participation in the ownership of the company and, of course, a greater voice in the selection of its management. This, he believes, should insure a greater sense of continuity and stability throughout the entire organization.

A relatively large number of the present professional staff are included in the plan because, according to Dr. Dorr, the activities of the company cover so many diversified fields. Furthermore, he points out, it is contemplated that as the "initial fifty" reach retirement age or leave the organization for other reasons, their shares will be re-acquired by the company and become available for re-issuance to other members who were not included originally. Thus, he observes, a powerful incentive has been provided for all members of the staff to continue taking initiative and accepting responsibility so as to be eligible when more "tenure stock" is available for subscription.

Our congratulations to all concerned—but particularly to the good Drs. Dorr and Dow who believe that democracy, like charity, begins at home.

Teamwork in Science and Technology

AS NOTED by President Hovde elsewhere in this issue, the nation's research program may be likened to a three-legged stool. The universities, industry and the military are its supports. None of these can stand alone nor can we have a stable structure without all three.

Rear Admiral T. A. Solberg, who also spoke at the Chemical Engineering Award dinner, aptly said. "Neither the universities nor industry could long exist, one without the other. Without them both, the military would soon be relegated to the scrap heap."

In a later address in Washington last month before the American Council of Commercial Laboratories, the same vigorous Chief of Naval Research paid a high compliment to the research of both academic and commercial institutions. "From our experience," he said, "it is evident that support of basic research in universities and other technical institutions could be increased by two-fold. There are no doubt many who would oppose the use of academic institutions by industries. However, there are many advantages in using such facilities for basic research. I firmly believe that if properly selected basic research were so placed under well controlled conditions, that not only industry and the colleges would benefit, but also our national resources in science would be greatly strengthened."

In the Harness

DURING the AIChE meetings in New York a group of us gathered around Walter A. Schmidt to learn the latest news of his amazing and often amusing colleague, Dr. Frederick G. Cottrell. We were told how vigorously that veteran scientist, engineer and inventor continued to pursue his chosen work—as if hurrying because so little time remained. Even as we talked, Dr. Cottrell was on his way to attend a scientific meeting at the University of California. Four days later, while crossing the campus at Berkeley, he was struck down by a heart attack. Thus ended a long career, crowded with great achievements and honors richly deserved.

Almost fifty years ago, as an instructor at this same university, he developed and patented the method of electrostatic precipitation that has made "Cottrell" a definite part of the language of every chemical and metallurgical engineer. Had he decided to settle down to

manage and exploit his invention, he would certainly have amassed a fortune. Instead he chose to set up the Research Foundation as a non-profit organization to use the financial returns from his patents in order to assist other scientists in their struggle for progress. Today nearly 300 active grants-in-aid represent current commitments in excess of a million and a quarter dollars.

But there were many other facets to this great man's career. They reflected intense interest in practically every phase of human endeavor. He was a sympathetic and inspiring friend of thousands of chemists and engineers. A willing worker in any enterprise, he always pulled his share of the load. It is appropriate that he should have died in the harness.

A Wise Owl Club in Your Plant?

To be eligible for membership in a Wise Owl Club a man must have had his eyesight saved by taking proper safety precautions, such as the wearing of goggles. These clubs originated in the idea that any worker deserves recognition when he can show that he has been careful enough actually to preserve his own eyesight by observing necessary precautions.

One of the enthusiastic sponsors of this idea is the Office of Rubber Reserve, which controls the synthetic rubber plants of the country. But there is undoubtedly a good place for it in many other establishments. We all know there is no more unfortunate handicap resulting from accident than the loss of sight. Any aid or stimulus to the preservation of sight is, therefore, worthwhile.

Our Part in the Marshall Plan

Chemical engineers and technologists will find much of interest and value in the work of the Anglo-American Council on Productivity, established late last summer on the joint initiative of Sir Stafford Cripps and Paul G. Hoffman. Its preliminary report is in the language of our profession. It sees the problems of increasing productivity largely in terms of spreading know-how and production techniques. It has set up a committee to arrange for plant visits over here by British employees with reciprocal visits from representatives of American management and labor to English plants. Another group will engage in studies of the level of productive plant and power in particular industries and determine whether or not the rate is rising or falling in relation to the British economy. New methods of measuring and comparing productivity are going to be worked out in collaboration with certain companies having comparable plants, both in the United Kingdom and in the United States.

All in American industry have a stake in the broad program of the Council. Unless England can get back on her feet industrially, there is little hope for a free and prosperous Europe. Hence, it is our responsibility to help in every way we can toward increasing the efficiency and productivity of our best friends and customers across the sea.

Extended Leadership

Someone has defined the true executive as the leader who delegates authority and responsibility to others for all phases of an enterprise except those in which he alone is most proficient. Thus today there is a trend in American business toward a more logical division of top management as between a company's president and the chairman of the board of directors. The former becomes the operating head of the business, responsible for its active direction and organization. Meanwhile the chairman, as senior officer, is relieved of administrative details so that he may concentrate on over-all problems and policies apart from the daily conduct of the business. And, it seems to us, board chairmen are a happy lot for they are doing the things they like most to do—and can do most efficiently.

We have a feeling that some of this very human philosophy of executive leadership is behind the significant moves that have just been made in the Dorr Co. In another place we have mentioned the new plan for employees to participate in the ownership and management of the enterprise. Now comes the news that Dr. Dorr is assuming the chairmanship of the company and is being succeeded in its presidency by Elmer R. Ramsey, who was formerly the operating vice president. On the surface this may not seem so significant because these two engineers have been associated since 1914 and in recent years have shared the top executive responsibilities. But in a broader sense it means that the Dorr Co., which has long since outgrown its clothes as a "one man" organization, now becomes a better balanced team of professional engineers and business men.

We are certain that Dr. Dorr is going to undertake and enjoy the things that he likes most to do. More than ever, he can indulge his insatiable curiosity for finding out what his far-flung family of engineers and associates can do to make the world a better place in which to live. The contributions which his inventions have already made to mankind are probably greater than those of any other chemical and metallurgical engineer of our times. But he is going to be able to guide and expand them into new and uncharted fields now that his influence and leadership are extended to the broader provinces of professional and public interest.

Volume 56—Chemical Engineering—Number 1

Chemical Engineering, with which is incorporated *Chemical & Metallurgical Engineering*, is the successor to *Metallurgical & Chemical Engineering*, which in turn was a consolidation of *Electrochemical & Metallurgical Industry* and *Iron & Steel Magazine*, effected in July 1906.

The magazine was originaly founded as *Electrochemical Industry*, in September 1902, and was published monthly under the editorial direction of Dr. E. F. Roeber. It continued under that title until January 1905 when it was changed to *Electrochemical & Metallurgical Industry*. In July 1906 the consolidation was made with *Iron & Steel Magazine* which had been founded eight years previously by Dr. Albert Sauveur. In January 1910 the title was changed to *Metallurgical & Chemical Engineering*, and semi-monthly publication was begun Sept. 1, 1915. On July 1, 1918, the title was changed to *Chemical & Metallurgical Engineering* and weekly publication was begun Oct. 1, 1919. Monthly publication was resumed in March 1925.

In August 1946 the words "*& Metallurgical*" were dropped from the main title to bring its name more in keeping with the editorial content.

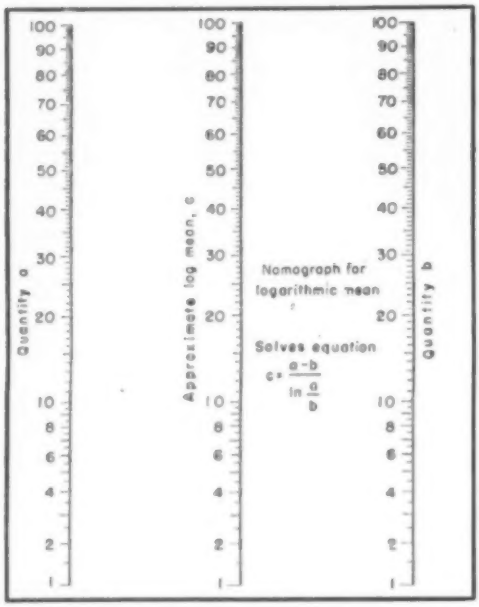
Dr. E. F. Roeber was editor of the paper from the time it was founded until his death Oct. 17, 1917. After a brief interim he was succeeded by H. C. Parmelee. Ten years later, Nov. 1, 1928, Dr. Parmelee assumed other responsibilities in the McGraw-Hill Publishing Company and Sidney D. Kirkpatrick was appointed editor.

The present editorial staff of the magazine comprises, in addition to Dr. Kirkpatrick: James A. Lee, managing editor; H. M. Ratters, market editor; T. R. Olive, associate editor; E. C. Fetter, J. A. O'Connor, L. B. Pope, R. E. Warren and Roger Williams, Jr., assistant editors. Editorial regional representatives are: J. R. Callaham and J. F. Cosgrave, San Francisco; J. V. Hightower, Houston; R. S. McBride, Washington; E. S. Stateler, Chicago.

[All rights to above magazine titles are reserved by McGraw-Hill Publishing Company, 330 West 42nd St., New York, N. Y.]

THE PLANT NOTEBOOK

Theodore R. Olive, ASSOCIATE EDITOR



Simplified Nomographic Chart Solves Equation for Logarithmic Means

JOHN P. SNYDER
Chemical Engineer, Indianapolis, Ind.

★ November Contest Prize Winner

IN CALCULATIONS of heat transfer and absorption coefficients the logarithmic mean of two quantities is often used, but it is always troublesome to calculate directly from the formula. It is possible to find this mean with a nomograph exact theoretically, but not practical in that a short line connecting the two quantities must usually be extended a long distance before it strikes the scale giving the mean.[a] Two empirical nomographs have been presented in standard chemical engineering textbooks,[b, c] and they are far more practical than the exact chart.

Since these empirical charts consist in part of curves, and thereby cause some difficulty in construction as well as use, the possibility of a log mean nomograph with three parallel straight lines was considered. It was found that one can be drawn with a range of 1 to 100 units and a precision closer than 1.2 percent in all cases, but reaching even slide rule accuracy much of the time. The maximum error is not only close to the error of construction and use of most nomographs, but it is well within the usual experimental error of work involving the use of the logarithmic mean, since the log mean is usually a simplifying approximation when it is used in these engineering applications.

Approximate Log Mean Functions

F = Log Mean Function of Number N

N	F	N	F	N	F
1.0	0.000	26	4.571	64	6.616
1.5	0.324	28	4.732	66	6.705
2.0	0.586	30	4.886	68	6.792
2.5	0.810	32	4.852	70	6.878
3.0	1.004	34	4.972	72	6.962
4.0	1.333	36	5.108	74	7.044
5.0	1.613	38	5.238	76	7.125
6.0	1.853	40	5.363	78	7.204
7.0	2.068	42	5.484	80	7.282
8.0	2.262	44	5.602	82	7.359
9.0	2.440	46	5.716	84	7.435
10	2.603	48	5.826	86	7.509
12	2.903	50	5.933	88	7.582
14	3.168	52	6.038	90	7.655
16	3.407	54	6.140	92	7.726
18	3.627	56	6.240	94	7.796
20	3.832	58	6.337	96	7.865
22	4.023	60	6.432	98	7.933
24	4.202	62	6.525	100	8.000

The preparation of the chart consisted first of deriving a "log mean function" of numbers, such that half the sum of the functions of any two given numbers would be approximately the same function of the log mean of the two numbers. This function would then be analogous to the log function for geometric means. By arbitrarily assigning to 1 the "log mean function" 0, and to 100, 8, the function 4 would be assigned to the log mean of 1 and 100, or 21.50. The function 2 would be assigned to the mean of 1 and 21.50, the function 6 to the mean of 21.50 and 100, and so on.

In the table thus found, the fourth differences were considerably irregular, and the log mean of other pairs of numbers could not be found accurately. Therefore, the data were readjusted to give the more accurate and regular table presented here. The nomograph is constructed as shown by drawing three parallel equidistant lines and marking on each the numbers N at distances from the "1" mark proportional to the log mean function F, the three "1's" being colinear.

Its operation is standard: connect the given numbers on the outer scale with a straight line, which intersects the

December Prize Winner

A $50 prize will be issued to

C. A. COLEMAN

The Barrett Div., Allied Chemical & Dye Corp.
Philadelphia, Pa.

For an article which presents a simple method of making periodic checks of feed rate to multiple continuous reactors supplied from a common feed tank, which has been judged the winner of our December contest.

This article will appear in our February issue. Watch for it and the other handy ideas in the Plant Notebook!

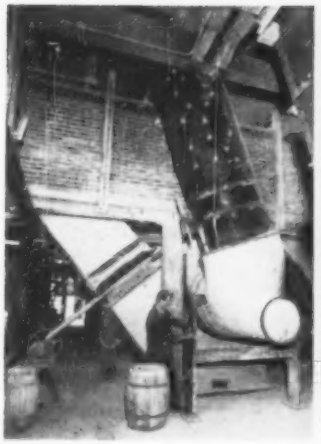


Fig. 1—Duct from high temperature fan showing wires to hold blankets in place.

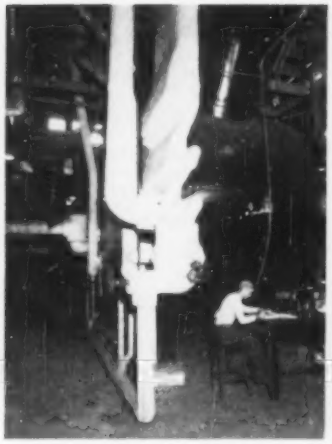


Fig. 2—Groups of pipes from the waste heat boiler were insulated as a unit.

Fig. 3—Blanket insulation 2½ in. thick was applied to converters and exchangers.

central scale at the log mean. For other ranges, multiply each scale by the same power of 10. The form of this nomograph makes it also suitable for application to special slide rules.

References

1. Clarke, L., "Manual for Process Engineering Calculations," McGraw-Hill Book Co., Inc., New York, 1947.
2. Kraitchik, M., "Alignment Charts, Construction and Use," D. Van Nostrand Co., Inc., New York, 1944.
3. Sherwood, T. K., and Reed, C. E., "Applied Mathematics in Chemical Engineering," McGraw-Hill Book Co., Inc., New York, 1939.

How Insulation Is Used in Large Eastern Sulphuric Acid Plant

JOSEPH C. MOORE
Harry W. Smith, Inc., New York, N. Y.

IN A LARGE eastern chemical and sulphuric acid plant, experiments in the use of mineral wool insulation have been going on for some seven years, ever since the converters were first installed in the acid plant. A variety of problems have been met in the insulation of large fans, a waste heat boiler and its piping, filters, converters, heat exchangers, an economizer, and high temperature steam piping. The acid plant is a conventional type, burning molten sulphur with predried air, with a waste heat boiler used to cool the SO_2 partially before conversion. The gases then pass through filters to the heat exchangers and converters, then through an economizer to preheat boiler feed water, and finally to the absorbers.

How large ducts are insulated is clearly shown in Fig. 1. Here a section of duct leaving one of the hot gas fans has not yet been insulated and the 8-in. lengths of galvanized wire welded to the duct can be seen. These wires will be used to impale 1-in. thick mineral wool blankets sandwiched between light-gage galvanized woven wire or expanded metal lath. When the blankets are in place, expanded metal side up, the wires will be bent over and the sections of blanket laced together at the edges with galvanized wire. Finally the blanketing will be covered with a ½-in. layer of mineral wool insulating cement trowelled in place.

Some 500 ft. of piping in sizes from 4 to 10 in. for the distribution of 600 deg. F. steam has recently been covered with a second form of mineral wool—molded pipe insulation. Some of the piping is insulated with a single 2-in. layer, some with a double layer of 4 in. The sections are fitted around the pipe and bound in place with metal bands, each layer being bound in case of a double layer. Larger pipe is covered with blanket insulation wrapped around the pipe, bound in place and coated with insulating cement. Piping carries a protective coating of roll roofing bound in place. Flanges are insulated by building up the flanged sections, ¾ in. at a time, with mineral wool cement.

An unusual method is used in insulating the piping from the waste heat boiler shown in Fig. 2. The several pipes running to an overhead distributor drum are close together and are therefore insulated as one large unit, with blankets wrapped around the entire bank, bound in place and finished with metal lath and a trowelled insulating cement coating. Here too valves and flanges are carefully covered with ¾-in. cement layers built up to 2½ in. Fig. 3 shows a converter and heat exchanger, indicating the method of insulating such vessels, as well as the hot filters. Here a 2½-in. layer of mineral wool blanket, covered with ¾ in. of cement, is used. A similar treatment is accorded the large expansion joint, of which the plant uses several.

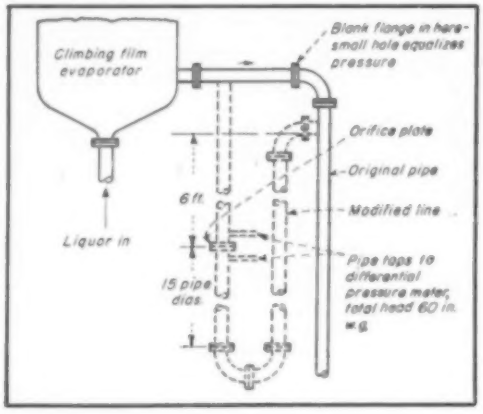
One feature of the methods of insulating used in the plant is the ease with which sections of the blanketing can be removed if repairs must be made. For example, the economizer following the converters developed a number of leaks. It was necessary to remove the insulation only where the repairs were made, after which it was easy to replace the blankets on the wires welded to the metal and refinish the surface, without disturbing the surrounding insulation.

Electric Radiant Heat for Roads

DURING the winter of 1946-7 the Plant Notebook carried an article (December 1946) and a later progress report (April 1947) describing the hot-water snow melting system installed in 600 ft. of two-lane concrete highway entering the Bridgeville, Pa., plant of the American Cyanamid Co. The system worked well and economically and readily kept the highway clear, according to reports at the

time. It is therefore interesting to learn that the Michigan State Highway Department will experiment this winter with a 1,000 ft. length of highway at Ferndale, Mich., which is to be heated electrically.

The heating grids are made by welding electrodes to the ends of 98-ft. sections of standard 2-in. sidewalk reinforcing mesh, 18 in. wide, which have been embedded 1½ in. under the surface of the roadway under the two wheel tracks of the outside or passing lane. The cost for heating equipment for 1,000 ft. of single lane is about $2,500 and the units, which will be thermostatically controlled to cut out at about 35 deg. F., will be provided with about 50 watts of energy per sq. ft. of heating element, at about 65 volts. At 1c. per kwh. the cost will run about 75c. per hour per 1,000 ft., which is said to be much less than the over-all cost of present snow removal methods.


Climbing film evaporator
Blank flange in here - small hole equalizes pressure
Orifice plate
Original pipe
6 ft.
Modified line
Liquor in
Pipe taps to differential pressure meter, total head 60 in. w.g.
15 pipe dias.

Measuring Steam Condensate by Orifice At or Near the Boiling Point

I. M. MADDERN
Australian Paper Manufacturers Ltd.
Melbourne, Victoria, Australia

ENGINEERS of Australian Paper Manufacturers Ltd. desired to measure steam condensate leaving each body of their multiple effect evaporators. However, this presented certain problems. The condensate was at or near its boiling point, it contained dissolved corrosive constituents and it must be returned in the system for heat recovery.

Corrosive constituents precluded the use of sensitive positive displacement meters. The fact that the condensate was at or near the boiling point suggested that any sudden reduction in pressure might cause flashing. All differential pressure type meters cause a sudden reduction in pressure, but if one of these meters were placed under a hydraulic head greater than the reduction it caused, no flashing should occur.

An orifice plate was chosen for this purpose and installed in a piping arrangement shown in the diagram. Original piping is shown in full lines, alterations are in dotted lines. A blank flange inserted in the original piping forced flow through the U-pipe while a small hole through the flange equalized pressures on both sides of the U. This arrangement insured a hydraulic head of 72 in. above the orifice plate, which was designed for a maximum differential pressure of 60 in. water gage. A recording differential pressure meter connected to the orifice pipe taps completed the installation.

Checks conducted over short periods proved the metering device to be accurate. These checks were made by extracting condensate after passing through the meter, cooling and measuring it externally.

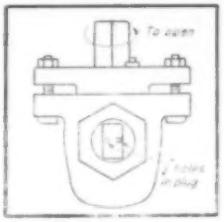
Installed on all bodies of the multiple effect evaporator, these meters are now providing a measure of actual heat transfer in each evaporator body, and valuable control data not previously recorded.

Plug Cock Modified for Throttling

EDWARD J. CORONA
Senior Chemical Engineer, Permanente Metals Corp.
Baton Rouge, La.

ON ONE of the pressure vessels in our plant a 2-in. AP cock is used to bleed off air when the vessel is being filled. However, when this cock is closed and the run commences, an excess amount of air collects in the vessel.

It was found that a ½-in. opening, bleeding continuously, would take care of this surplus air. An obvious solution was to use a three-way cock, with one discharge to a ½-in. opening and the other to a 2-in. opening.



However, rather than buy new cocks, I found that the standard AP cock could be modified to do the job. This was done by taking a standard 2-in. cock in the closed position and boring a ½-in. hole through each side of the plug. By careful alignment of the ½-in. openings, it was found that the cock could be operated in the fully open, the ½-in. throttling and the fully closed positions. As the sketch shows, however, note that the holes were drilled so that as the cock is opened the ½-in. holes are closed before the main ports open.

$50 CASH PRIZE FOR A GOOD IDEA!

Until further notice the editors of *Chemical Engineering* will award $50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook. The winner each month will be announced in the issue of the next month: e. g., the January winner will be announced in February and his article published in March. Judges will be the editors of *Chemical Engineering*. Non-winning articles submitted for this contest will be published if acceptable at our usual space rates.

Any reader of *Chemical Engineering*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible. Articles may deal with any sort of plant or production "kink" or short-cut that will be of interest to chemical engineers or others in the process industries.

Also, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address Plant Notebook Editor, *Chemical Engineering*, 330 West 42nd St., New York 18, N. Y.

Benefit Plans

For Professional People in the Chemical Industry

As HUMAN beings have reached out for more and more security in an unsecure world, they have been asking questions of their employers. Progressive companies have answered by setting up benefit plans, schemes designed to increase the security of their employees. Along with other employees, chemical engineers have benefited. Here are the results of a *Chemical Engineering* survey of 32 of the leading companies in the chemical field, outlining what they are doing for the future security of their chemical engineers. Here, compared and analyzed, are the various plans—pensions, group life insurance, accident and health insurance, hospital and surgical insurance, vacations, bonuses, leaves of absence—that companies are using to make the future better than the past.

THE AGE-OLD requirements of mankind have been for food, shelter, and clothing. But as the world has developed, and nations and economic systems have progressed, another word has come into greater and greater prominence—security. With few exceptions, a major claim of the various economic systems in existence, or proposed to give a better world, is security. "Freedom from want" has been called a cardinal requirement in modern times.

But along with that desire for security has come a developing reliance on someone else rather than ourselves to provide the security. Business men have come to be looked on as one of the providers of that security. And business men have responded by setting up what are called "Benefit Plans." Such plans began to come into existence around the turn of the century, but expansion of them has been most rapid in the past decade.

The plans that have been set up by companies are many and varied. Some of them involve security for a man's family if he dies, security for him if he is disabled on or off the job, security when he is old and wants to rest from his lifetime of work. They involve extra methods of revenue in case the employee gets sick, or has an accident, or needs an operation. They are designed to keep him in good health by providing him with vacations and holidays. They help train him further by assisting in his education. They help him participate in public affairs by allowing him time off for such things as jury duty and armed forces reserve training without loss of pay. They give him bonuses for superior work or ideas.

All these and many more are the ways companies are benefiting their employees.

But why should a chemical engineer be particularly interested in them? First, he is as interested in security as the next person. Second, his security because of his position has been dropping, relatively. By that we mean the salaried chemical engineer no longer enjoys benefits that wage roll employees do not have. He is no longer privileged.

Therefore, more and more engineers have to look at the benefits employers are giving them and see how adequately those benefits will safeguard their future. And safeguard it at a standard of living that approaches their present one.

To determine the benefits chemical engineers are receiving from their employers today, *Chemical Engineering* has surveyed some of the plans in effect in 32 chemical companies. These companies supplied us with partial or complete data on their benefit plans. These data have been correlated and compared and the results are presented here. There has been no attempt to get complete coverage; the aim was to obtain an objective look at the type of plans now in existence.

First, and foremost perhaps, come pensions.

Pensions

WHEN the term Employee Benefits is used, the user often means only one type of benefit—pensions. For some reason pensions seem to have caught public appeal more than any other form of benefit plan. So it is perhaps reasonable that such plans should be discussed first.

Old age security has come more and more to the forefront in recent years. First came the enactment of the Federal Social Security Act. In the middle 1930's many such old age plans were discussed, perhaps the best known being the Townsend Plan. Then the Beveridge Plan in England and other plans came along, popularly to give "cradle-to-grave" protection.

More recently, the successful fight of the United Mine Workers to get pensions for miners led to increased union interest in pensions. This was climaxed in the spring of 1948 when the National Labor Relations Board ruled that pensions were a proper subject for collective bargaining.

Chemical Engineering has surveyed chemical company pension plans before (July 1948, pp. 175ff). Hence, in many ways, this portion of the present report will be a reamplification of the previous study. In any report on benefit plans, pensions must be included for completeness.

Almost every chemical company of any size has a pension plan today. And some of them were first instituted as early as 1904. But the plans do vary widely in their form and in the amount of pension an employee will receive. The table, which summarizes the plans of 20 different companies, perhaps emphasizes this best.

If we assume a young chemical engineer of age 25, starting with a salary of $260 per month, estimate he gets a raise of $16 per month each year, and then calculate the pension he will receive, we arrive at the figures shown in the table. This table is a modification of the table published in July. Reasons for the modification will be discussed below.

PENSION PLANS

Basis: Employee assumed to begin work for each company at age 25 with a salary of $260 per month, receives a raise of $16 per month each year until retirement at age 65.

Company	Total Amount Contributed by Employee During His Employment*	Total Annual Pension Received*
1	$1,200	$5,052
2	1,200	4,278
3	1,200	4,278
4	1,200	3,802
5	1,200	3,534
6	1,200	2,784
7	1,200	2,724
8	13,710	5,899
9	11,022	5,504
10	10,200	5,184
11	13,783	5,034
12	12,295	4,949
13	10,585	4,854
14	11,360	4,728
15	11,070	4,634
16	11,880	4,195
17	10,685	4,004
18	9,270	3,904
19	9,710	3,876
20	8,190	3,839

* Amount contributed by employee includes his payments to the government for Social Security; pension received includes estimated Social Security.

From the table it can be seen that there is a wide variation in the amount of the pension, the largest shown being more than double the smallest. It can also be seen that there are two distinct types of pension plan, those where the company pays the entire cost (except Social Security payments by the employee), and those where the employee contributes to the cost of the plan.

Plans Compared

Taking first the group where the employee contributes to the plan, there is one similarity in the plans which is not immediately apparent. Even with pensions as widely different as $5,899 and $3,830, the percentage that the annual pension is of the total amount contributed by the employee is fairly constant. The maximum percentage is 51 and the minimum 35, but the majority are about 40-43 percent. As a matter of fact, 6 out of the 13 fall in this range. From a study of the plans involved, this appears to mean that these companies are paying the cost of two-thirds of the pensions and the employees about one-third. The companies

are paying for all the clerical work involved.

Almost all of these plans involve insurance companies. In a couple of cases, however, the company is handling the entire pension itself by means of a special trust fund. These trust funds are usually administered by members of the Board of Directors who are not active officers.

Turning now to cases where the pension is essentially free, except for social security payments by the employee, there is no easy correlation. The pensions involved range from $5,052 down to $2,724.

Like the contributing cases above, these pensions are usually based on the employees earnings, one way or the other. In the contributing cases a table is usually set up and both the retirement annuity purchased and the employee's payments rise along with his salary. In the free pension cases, the pension is usually based on a percentage of the employee's earnings together with a factor representing length of service. For instance, Companies 2 and 3 each give a pension based on 1 percent for every year of service times the average employee earnings over the last 10 years employment. This seems as representative as any of the free plans.

In considering this table and the table of group life insurance benefits to be discussed below, it should be remembered that the company numbers on the two tables are not the same. Company 3 in the pension plan table is not the same company as No. 3 in the life insurance table.

Social Security Deductions

We mentioned above that the table on pensions is somewhat modified from that presented in July. Two changes have been made. First, the employee payments toward Social Security have been included. Second there was some question in a few cases where Social Security was not included in the July table.

Often where the pension received is given free by a company, the company figures a total pension and then deducts what the pensioner will receive from Social Security before paying him the net company pension. One company puts it this way:

"The plan is designed to give every eligible employee at normal retirement age an adequate retirement income, and this company pension will supplement the Federal Social Security Act benefits to bring the total retirement benefits up to levels considered by the company to be adequate."

But where the previous table was wrong is that some companies only deduct *half* of the Social Security payment. Companies 2 and 3 are examples, and Company 6 may be. The reason these companies deduct half is that it represents the portion of Social Security payments which were made by the company. At present the company and the employee each contribute equal amounts.

We said Company 6 "may" only deduct half the Social Security payment. We are not sure. The company's plan says definitely that the pension is so-and-so much, "less the Primary Insurance Benefit under the Federal Social Security Act." But then here is how they define the Primary Insurance Benefit:

Benefit Definition

"For the purpose of the Plan, the Primary Insurance Benefit under the Federal Social Security Act shall, in the case of each participant, mean and be limited to the Primary Insurance Benefit under the Federal Social Security Act, as amended, and as in effect on the effective date of the Plan, to which said participant shall be entitled as a direct benefit, upon making application therefor, with respect to and upon the basis of his compensation from the Company (and, if a retransferred employee, by the corporation by which he shall have been employed) as reported to the United States Government by the Company (and by such corporation) for the purpose of said Federal Social Security Act, but shall not include any supplemental benefits which may be payable under said Federal Social Security Act to the wife or other dependents of said participant."

One pension plan we have run across might be of interest, even though it is not one of a chemical company. The company involved is a medium sized well drilling supply company. It has what it calls a "Profit Sharing Trust." The trust works this way:

First, each year the company figures its profits before taxes but after a reserve of 8 percent of the net worth of the company. Then it pays into a trust fund an amount calculated from the above earnings as follows: 50 percent of the first $50,000, 40 percent of the next $25,000, 30 percent of the next $25,000 and 25 percent of all remaining earnings. The amount put into this trust fund is then split to all participating employees on the basis of the share the employee's pay was of total wages. The trustees of the fund then purchase for each employee a combination life-retirement policy as big as is possible considering the cash in the employee's account and the premiums involved for the annuity.

That is the bare outline of the plan. It is one that seems rather ideally suited to a small company. It is, also, a plan which tends to give an employee incentive to increase the earnings of the company as a whole.

At the beginning of this section on pensions we pointed out that unions were becoming increasingly interested in pensions, and that employers seem now to be required to bargain on the subject. Perhaps we can conclude the section best by quoting a union leader, Philip Murray, on the subject:[1]

"The reasons we are interested in pensions are four:

"First of all, we want to protect our membership against arbitrary dismissal.

"Second, we want positively to secure for workers the right to be able to decide, upon attaining a reasonable age, whether to retire or to continue working, with the choice made a real one by the availability to them of a substantial retirement income in event the decision is to retire.

"Third, we want to secure the right of persons who become disabled and permanently unable to work to a sufficient income to maintain a reasonable standard of livelihood.

"Fourth, we want proper pension plans as an aid to maintaining a labor force of the optimum size in relation to the changes in our population, and particularly the changes in the proportion of older workers."

Vacations

MANY a chemical engineer has little contact with benefit plans. If he stays healthy, the life insurance, hospitalization and surgical plans are just some of those nice safeguards in the background. Pensions are years ahead. But there is one form of company benefit that he enjoys every year

—would like more of. That's vacation.

For a number of years now companies have been fairly well standardized on vacations. And yet, in just the past two or three years there has been a steady change in one provision.

In almost all the companies surveyed, if you come to work for a company before April or May first you get one week of vacation that year. The next year, and from then on, each year brings a two-week vacation.

The new thing in vacations is the provision for another, or third, week after fifteen years of service. Some 70 percent of the companies surveyed have added that provision. A few companies have even gone farther. One gives four weeks during the 25th, 30th years and all years beyond 34. Another gives two weeks and a day in the 5-7 years of service bracket, two extra days each next pair of years until the full three weeks is reached the 15th year of service.

There are two rules about vacations that are generally stated, although they are often waived for special occasions. The first is that the two, or three, weeks must be taken together. The second is that you can't take the last two weeks in December and the first two weeks in January and end up with four consecutive weeks.

While on the subject of vacations, there is another closely related subject—holidays. The companies surveyed were almost unanimous on that subject: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas.

Group Life Insurance

ANOTHER form of benefit which has become more and more prevalent in recent years is group life insurance. Employers had seen many and many a case where an employee died from a non-occupational injury or sickness and left practically nothing to his widow and family, often not even enough for burial expenses. And many an employer had dug into his pocket to help in such cases. It was natural for employers to make the next move—provide their employees with a form of inexpensive life insurance.

The result has been that some 37 percent of manufacturing establishments have life insurance plans, at least 37 percent of 15,636 industrial establishments surveyed recently by the U. S. Department of Labor. The chemical industry has been one of the leaders in this move.

GROUP LIFE INSURANCE

Basis: The table shows the life insurance which a chemical engineer with 10 years service and a $6,000 per year salary could obtain through a company sponsored group insurance plan.

Company	Life Insurance	Accidental Death and Dismemberment Insurance	Cost to Employee per Month
1	$12,000	$10,000	$9.66
2	7,200	7,200	†
3	7,500	5,000	†
4	10,000	-	6.00
5	7,000	-	3.50
6	5,000	1,000	-
7	6,000	-	6.50
8	6,000	4,000	†
9	5,000	-	3.00
10	5,000	-	2.10
11	5,000	-	4.20
12	3,000	-	1.50
13	5,000	5,000	-
14	3,000	-	†
15	5,000	5,000	2.50
16	4,000	-	2.40
17	6,000	-	1.80
18	3,000	-	1.80
19	2,000	-	†
20	2,000	2,000	†
21	2,000	-	-
22	1,500	-	-
23	1,000	-	-

[1] Maximum insurance available is based on years service with company. The figure shown is the maximum. [2] Amount shown includes $1,000 of free insurance, $2,500 of insurance which the company partially pays for. The amount shown includes $1,000 of free insurance, $3,000 of insurance which the company partially pays for. [4] Maximum insurance available is based on both salary and years of service. The figure shown is the maximum. [5] The employee can purchase up to $6,000 additional insurance at a cost of 60c. per mo. per $1,000. The $2,000 life insurance shown is free. [6] The employee can purchase up to $10,000 additional insurance at standard premiums which the company will deduct from his salary check and pay the insurance company directly. [7] In these cases the payment is combined with Hospitalization, Surgical, and Accident and Health insurance. Hence the payment actually required for life insurance cannot be separated.

A group life insurance scheme is usually a joint proposition between the company involved and an insurance company. In this survey of the plans of some 23 companies (see table) almost all the big insurance companies are represented. Some of them are Prudential, Travelers, Equitable, Metropolitan, General American Life, Aetna, and Occidental Life of California. As is true with pensions, the plans of different companies vary widely.

The usual group life insurance policy sets up a graduated scale of policies based on salary. The higher an engineer's salary, the greater the amount of insurance he gets or can buy. The maximum generally is in the $5,000 to $10,000 bracket. In most companies the employee and employer about split the cost of the premiums with the company supplying all the clerical work free. The cost to the employee is generally 60 c. per month for each $1,000 of this type of insurance.

As usual with insurance plans, there are a lot of words in small print that vary from contract to contract, but the following outlines the average plan.

An employee becomes eligible to obtain life insurance after he has been employed by the company for three months. Then, depending on his salary, he can subscribe for a given amount of insurance by signing an application blank. Generally he does not have to take a physical examination. From then on, until his salary changes, his share of the premiums are automatically deducted from his salary check by the company. When his salary does change, and he goes into another insurance bracket, the company automatically makes the change and the policy value and premiums become larger.

In some companies, the amount of insurance depends on length of service too. For instance, one company starts the employee out with $500 at the end of the first year, and then increases the amount each year by $500 until the maximum of $2,000 is reached. Here the amount of the employee's salary does not count. In another case, both years of service and salary count in determining the amount of insurance.

Disability Clauses

The usual group life policy also contains a total disability clause, a few a partial disability clause. In the legal gobbledegook that employees are supposed to understand, here is how one insurance company puts it: "If you become totally and permanently disabled while insured the Plan, and prior to age 60, through either sickness or accident, the Life Insurance will be payable to you, during continuance of such disability, in monthly installments. The first payment will be made six months after commencement of such disability, but not less than three months after receipt by the Insurance Company of due proof thereof. Employees shall be entitled to this benefit only for such disability commencing after they have been continuously insured hereunder for one year, provided such employees are then actively at work."

Often too a company sets up a separate disability insurance plan. But more about that below.

There are several other provisions that run through most of the group life insurance plans surveyed. For one thing, the usual plan requires no medical examination. Another is the conversion privilege in case you leave the company. Most plans have a paragraph similar to the following:

"Although your Life Insurance automatically terminates thirty-one days after termination of employment, you nevertheless will be entitled to have issued to you, without medical examination, provided you make application to the Blank Insurance Co. within thirty-one days after termination of employment, a policy of Life Insurance in any one of the forms customarily issued by the Blank Insurance Co. (except Term Insurance), in an amount equal to—or, at your discretion, less than—the amount of your protection under the Group Life policy, but not less than $500, upon the payment by you of the premium applicable to the class of risk to which you belong and to your age at the time of conversion, such policy to become effective at the end of thirty-one days after termination of employment."

Of course, in those cases where the company gives the employee life insurance free the insurance is usually cancelled completely if the employee stops working for the company.

After Retirement

The provision in group life policies that differs widely is what happens to the life insurance after the employee retires.

In most of the cases where the employee gets the insurance free it is continued by the company on retirement. Sometimes, however for a lesser amount.

Company 4 in the table automatically reduces the insurance over a five year period after retirement to a minimum of $1,500. This minimum then goes on completely paid by the company.

Company 7 splits its insurance in half. One half remains in force free at retirement, the other half may be converted by the retiring employee to regular insurance.

Company 8 gives a pensioner free insurance based on a minimum of $500 which is increased by $100 for each six months of service record up to a maximum of $2,000.

Company 3 gives a pensioner $750 free insurance at retirement and the pensioner can convert the other insurance he had under the plan.

Company 16 allows a pensioner to make the same contribution he did while he was working and continues the insurance.

Company 1 gives the pensioner $2,000 of free insurance if his earnings in his last working year were above $3,000. He gets this insurance only after he has been retired for a year. The first year the regular group life policy is continued.

Company 2 says this: "Upon retirement the Group Life Insurance will not be terminated entirely, but the amount will be reduced to one-half the amount in force, not to exceed $7,000, for which the company will defray the entire cost."

And so it goes. Apparently both the insurance companies and the chemical companies are still groping for the best method to handle the insurance at retirement. What the final compromise will be is anybody's guess.

Accident Insurance

We mentioned above that some companies are now including accidental death and dismemberment insurance in their group insurance plans. This insurance is included primarily to protect the employee from non-occupational accidents, where he would not be covered by the Workmen's Compensation Acts. Perhaps the best way to explain it is to quote one company's booklet.

"In the event of your accidental death or dismemberment, this insurance is payable, while you are insured under the policy, regardless of whether the accident occurred at work or away from work, and provided such death or dismemberment results directly and independently of all other causes, from bodily injuries caused solely by external, violent and accidental means and within ninety days from the date of the accident.

Indemnities Payable

"The full amount of the insurance will be paid for loss of life, or of both hands, or of both feet, or the sight of both eyes, or the loss of one hand and one foot, or of one hand and the sight of one eye, or one foot and the sight of one eye. One-half the amount will be paid for the loss of one hand or one foot or the loss of the sight of one eye. If more than one of the above losses is sustained as a result of any one accident payment will be made only for the loss for which the larger amount of indemnity is payable."

We presume that is clear. There is one catch in some of such policies: the accident must be non-contributory. In other words, if you have contributed to the accident (like standing on a stepladder) the insurance doesn't pay.

Accident and Health

Many companies are setting up plans, or have them, to provide additional revenue to employees when they are sick. Most chemical engineers are on salary and an engineer's salary usually goes on when he gets sick, for a while at least. This type of benefit plan is aimed at supplying supplemental money.

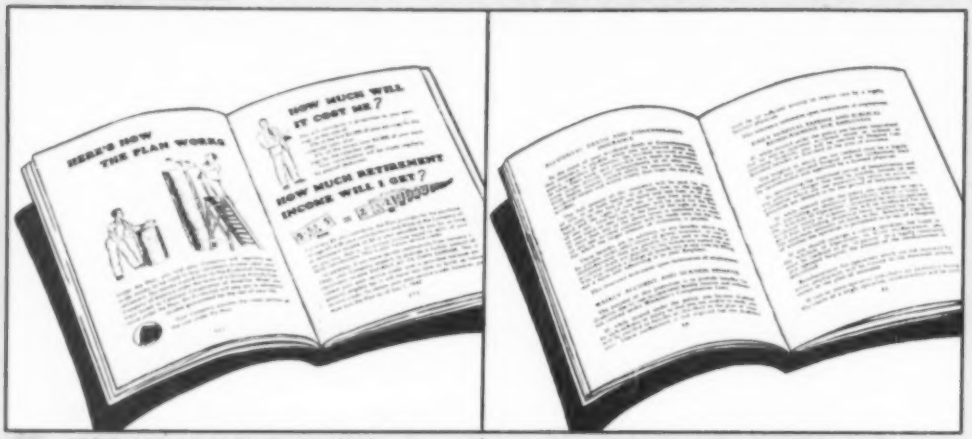
We said most salaries go on. Let's clear that up first. The average company seems to have no fixed policy, varies the time it will pay a sick salaried man with the particular case. One company puts it, "Salaried employees are paid by the company for varying lengths of time because of illness."

A few companies have formalized the length of time, based usually on length of service. For instance, one company pays one-year-men the full salary for the first week, 75 percent of the salary for the next two weeks, nothing thereafter. At the other extreme it pays men with 15 or more years of service their full salary for eight weeks and 75 percent for the next 10 weeks.

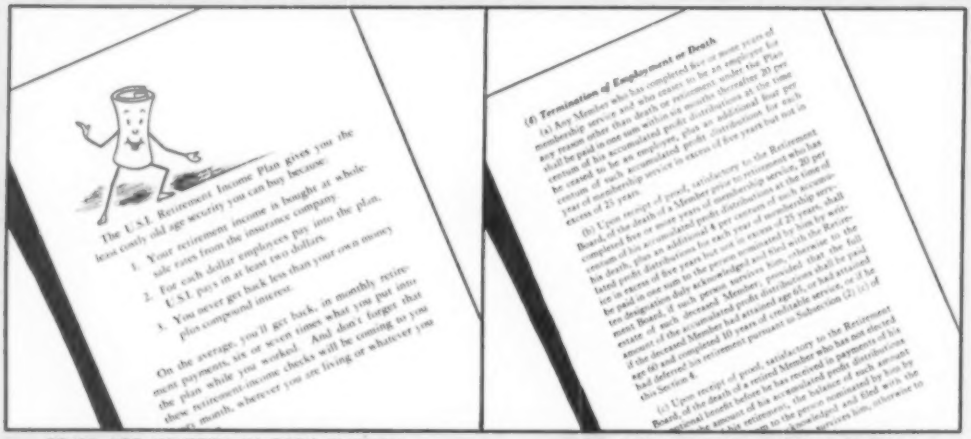
To get back to accident and health plans, most of them are such schemes as Blue Cross or similar plans operated by insurance companies. The plans vary somewhat in the amounts of money involved but are generally similar.

The first part of such plans is a weekly accident and sickness payment. This usually varies with the income of the employee, but is roughly 25-50 percent of his regular weekly pay. If we assume a chemical engineer earning $5,000 a year, most of the plans surveyed carry a weekly payment running from $25-45. In case of accidents, the payment usually starts on the first day. In case of sickness, the

Company Bulletins They make interesting contrasts in the way benefit plans are presented.



SOME ARE ATTRACTIVE, INVITING . . . . . OTHERS DRAB, FORBIDDING


The U.S.I. Retirement Income Plan gives you the least costly old age security you can buy because

1. Your retirement income is bought at wholesale rates from the insurance company
2. For each dollar employees pay into the plan, U.S.I. pays in at least two dollars
3. You never get back less than your own money plus compound interest.

On the average, you'll get back, in monthly retirement payments, six or seven times what you put into the plan while you worked. And don't forget that these retirement-income checks will be coming to you every month, wherever you are living or whatever you

(f) Termination of Employment or Death

(a) Any Member who has completed five or more years of membership service and who ceases to be an employee for any reason other than death or retirement under the Plan shall be paid in one sum within six months thereafter the Plan return of his accumulated profit distributions at the time he ceased to be an employee, plus an additional four per cent of such accumulated profit distributions at the time of membership service in excess of five years but not in excess of 25 years.

(b) Upon receipt of proof, satisfactory to the Retirement Board, of the death of a Member prior to retirement who has completed five or more years of membership service, 20 per cent of his accumulated profit distributions at the time of his death, plus an additional 4 per cent of such accumulated profit distributions for each year of membership service in excess of five years but not in excess of 25 years, shall be paid in one sum to the person nominated by him by written designation duly acknowledged and filed with the Retirement Board, if such person survives him, otherwise to the estate of such deceased Member, provided that the full amount of the accumulated profit distributions shall be paid if the deceased Member had attained age 65, or had attained age 60 and completed 10 years of creditable service, or had elected to defer his retirement pursuant to Subsection (2) (c) of this Section 8.

(c) Upon receipt of proof, satisfactory to the Retirement Board, of the death of a retired Member who has not elected optional benefits before he has received in payments of his annuity an amount of his accumulated profit distributions at the time of his retirement, the balance of such amount shall be paid in one sum to the person nominated by him by written designation duly acknowledged and filed with the Retirement Board, if such person survives him, otherwise to

SOME ARE WRITTEN IN EASY ENGLISH . . . . . OTHERS IN LEGAL GOBBLEDEGOOK

You come to work at U.S.I.
You enroll in the plan
You take on responsibilities
Time moves fast
You reach retirement age
AGE 65
And start to enjoy the benefits

AND ONE GOES AS FAR AS THE COMICS TO SELL THE ADVANTAGES OF "THE PLAN."

payment usually doesn't start until after eight days. This latter clause prevents the myriad claims that would come from the occasional absence due to a cold or similar slight sickness. Maximum length of payment is usually 13 weeks for each disability. Essentially all these plans are restricted to accidents that do not come under Workmen's Compensation.

In cost, these plans vary because they are often tied in with other forms of insurance such as hospitalization and surgical insurance described below. Two plans, under which most chemical engineers would receive $25 per week, cost $1.35-1.40 per month. A few companies present this type of insurance free to their employees.

Hospitalization

Hospitalization insurance usually consists of two items. The first is daily payment of hospital room and board; the second is payment for special hospital charges. The former has a top limit of $3-8 per day and the latter from $25 to $80 depending on the plan.

Here is how they work: "Hospital benefits are payable to the employee if he is confined, except as stated below, as an admitted patient in a legally constituted hospital, upon the recommendation and approval of a duly qualified physician or surgeon, and during such confinement requires the use of the bed and board facilities of the hospital. No Hospital Benefits are payable for confinement which results from an occupational accident, or from a disease for which the employee is entitled to benefits under any workmen's compensation or similar law.

"(1) A daily benefit in an amount determined by monthly wage or salary as indicated in the Schedule of Amounts of Insurance (in this case $7 for employees making more than $260 a month) during the period of confinement beginning with the first day up to a maximum of 31 days during any one disability except that a maximum of not more than 14 days will be paid in the event of hospital confinement due to pregnancy or resulting childbirth or miscarriage.

"(2) The employee also will receive the amount of special hospital charges for medical care and treatment, except charges for board and room, nursing care and attendance by a physician incurred during such hospital confinement up to a maximum of five times ($35 in this case) the Daily Benefit during any one period of disability."

In most of these plans the employee must go back to work following one disability before he can start another.

An added feature of these plans, and of most of the surgical plans, is that they also apply to the employee's dependents. In some cases the employee must pay extra to have his dependents covered, but they still can come in under the general plan.

Surgical Plans

Surgical insurance plans usually provide fixed amounts for different types of operations. The maximum varies with different insurance companies and plans, the lowest surveyed being $75 per operation and the highest $225. The almost universal figure is $150. Like the hospitalization insurance, cases which fall under Workmen's Compensation are not included.

The cost of hospitalization and surgical insurance varies all over the map, depending primarily on the portion of the premiums the company pays. In a few cases the insurance is given free for both employees and their dependents. In another, the employee gets both forms of insurance free, but he pays $1.83 a month to include his wife and children. In one company, 50 c. a month obtains $5 a day hospital payment with $70 for extras and $150 for maximum surgical payment for the employee only. In another company, 69 c. a month gets $4.50 per day hospital, $45 hospital extras, and $150 surgical maximum for the employee only.

Other Plans

THE BENEFIT plans discussed above cover all the major plans, that is major from the standpoint of cost to the company involved. There are some other plans, however, that deserve mention.

Few companies have definite written policies covering salaried men when they need brief periods of time off for personal reasons. But on the whole there is little question for such things as jury duty and military service. In cases of wage roll employees being called for jury duty, the employee is generally paid the difference between his jury fees and what his base pay would have been. With salary men, their salary is usually continued during such an absence. Military duty is often handled in the same way.

One company has set up a specific provision for what it calls "emergency personal leave." For specific reasons it will continue the employee's salary. One of the provisions, incidentally, is for leaves during strikes of wage roll employees.

Other, longer leaves of absence are often granted for periods of a year or more without salary, maintaining intact the employee's service record. Such leaves are most often advanced for education or travel purposes where the employee is attempting to improve himself, hence improving his value to the company when he returns to his work.

Suggestion Plans

Most chemical engineers lose out when it comes to suggestion plans—they are ruled out because it is a chemical engineer's specific job to make suggestions that improve plant operations.

On the other hand, some bonus schemes that are like suggestion plans include technical men. One of them specifically states that the "bonus awards may be granted for conspicuous service of any nature. Such service may take the form of—(a) An invention or improvement which results in a profit or saving, or in a reduction of risk of personal injury or damage to the company's property. (b) Unusually ingenious solution of a business or technical problem. (c) Perseverence and persistency of a character that results in demonstrating a proposition (in some instances against either internal or external opposition) that results in an important saving or benefit to the company. (d) An accomplishment by an employee of a character far beyond what might be expected of one occupying his position."

Bonus Plans

When it comes to regular bonus plans, the chemical engineer can often benefit. A number of companies have bonus schemes, based on the company's earnings, that reach down below the top executive level. Some of them are limited to salaried personnel; others are fixed plans that apply to all employees.

These plans have little in common except that they are based on the

earnings of the company in the specific year involved. Most of them deal only with the profits remaining after a given return on net worth has been set aside. At least one such plan is based on the dividends paid the stockholders. Another is based solely on years of service.

Service Pins

Most companies now have some method of publicly rewarding long service employees. In many, this consists of presenting the employee with a pin, engraved with the company name and, often, with the years of service. Most companies give pins at five year intervals. The 25 year pin often contains a chip diamond, with additional diamonds added each five years thereafter.

Clubs have been set up by many companies for 25-year men. Such clubs have regular dinners at company expense.

Pamphlets

There are other, more minor benefit plans which affect the chemical engineer. But we feel that they are of lesser importance than a discussion of the pamphlets that companies publish to tell their employees about their various benefit plans.

Admittedly, the average chemical engineer is well educated; knows, and understands the English language. But even chemical engineers cannot always understand the pamphlets. Most of them seem to be written by company lawyers, and they are typical of legal writing in that no sentence is shorter than a paragraph. You have read a couple of examples above and others were published last July. And don't forget that most of these booklets were not written for chemical engineers or employees with college educations. They are supposed to be understood by operators, pipefitters, mechanics.

Luckily there are some good booklets. Here is a quotation that is perhaps wordy but comparatively good. "For a number of years, the Company has recognized the value and importance of developing a pension plan which would give loyal employees, who are eligible for retirement, normally at age 65, a greater measure of security by providing them a substantial income for life as a reward for having devoted their skills and energies to the interests of the company. . . Because the plan is designed for you, this booklet has been prepared to give you a clear, simple description of the highlights of the plan —what it is, what its principal provisions are and how it applies to you, so that you may understand it thoroughly. We suggest you keep it in a safe place for ready reference."

That quotation comes from the introduction, and clear at the back of the booklet is the following: "A few copies of the complete text of the Plan have been printed and are on file in the Treasurer's Office and with each member of the Pension Committee if you want to borrow one. The complete text, rather than this booklet, contains the controlling provisions."

Now, let us compare that last with a quotation from the introduction of another booklet: "The description of the Retirement Plan in this booklet is explanatory only. The rights of the Participants are governed by the Trust Agreement between the Companies and the Trustees, dated November 6, 1945, and the Retirement Plan incorporated therein. A copy of this Trust Agreement and Retirement Plan is in the possession of each Company and the Trustees. Reference may be had thereto for a full description of the provisions of the Trust Agreement and Retirement Plan and rights and interests of Participants thereunder, upon application by any Participant."

Here, perhaps, is the best quotation we could find: "One thing that has helped this company to grow is ideas: CREATIVE IDEAS that have made work easier, products better, operations more efficient, and jobs safer. Hundreds of these ideas have paid off for our employees through this Suggestion System.

"Since this program was established in 1936, we have found that CREATIVE IDEAS are unlimited. As the Company grows, the opportunities for constructive suggestions increase for every employee. Winners have discovered that the keys to successful suggestions are watchfulness, study, and a never-ending search for improvements. It also is true that the more thoroughly an idea is thought out and studied, the greater its chance of acceptance. If your first idea does not click, keep on trying!

"This booklet outlines the monetary rewards which we are glad to pay. But I like to think that another reward just as important is the feeling of accomplishment—the thrill of a job well done.

"This booklet will show you how to submit your suggestions and how the decisions are made. I hope it will encourage everyone to keep constantly on the alert for new CREATIVE IDEAS, ideas that will help your company and give you personal satisfaction and extra money."

In the last analysis, benefit plans affect both employee relations and public relations. The importance of both is high, but hard to measure. Certainly such benefit plans gain little from an employee standpoint if they are not presented in a form the employee can understand.

Benefit plans are one answer to the problem that faces the world's population in its search for security. As the "Economist" so clearly pointed out, we are slowly losing the "carrot and the stick." This change has brought new problems to business men, problems that are more social than business. As J. E. Moody put it:[2] "Increasingly industrial management has acknowledged social responsibilities but the questions involved are so basic that common sense calls for the best efforts of all concerned to reach a solution. It must be a job well done and it calls for a high degree of economic and social comprehension and understanding."

Acknowledgment

In conclusion we would like to acknowledge the assistance of various officers, industrial relations directors, and public relations directors of the following companies who assisted in preparing this report by giving us information on their benefit plans:

Abbott Laboratories, Air Reduction Co., American Potash & Chemical Corp., American Smelting & Refining Co., Atlas Powder Co., Celanese Corp. of America, Davison Chemical Corp., Dow Chemical Co., E. I. du Pont de Nemours & Co., Eastman Kodak Co., Ethyl Corp., General Aniline & Film Corp., Harshaw Chemical Co., Hercules Powder Co., Hooker Electrochemical Co., Industrial Rayon Corp., International Minerals & Chemical Corp., Koppers Co., Lion Oil Co., Mathieson Chemical Corp., Merck & Co., Monsanto Chemical Co., Nopco Chemical Co., Pennsylvania Salt Mfg. Co., Chas. Pfizer & Co., Phillips Petroleum Co., Rohm & Haas Co., Sharpe & Dohme, Inc., Sterling Drug Inc., Texas Gulf Sulphur Co., U. S. Industrial Chemicals, and Victor Chemical Works.

References

1. Murray P., "Collective Bargaining on Social Security," *Jour. of Comm.*, N. Y., Sec. II, pp. 6, Sept. 1948.

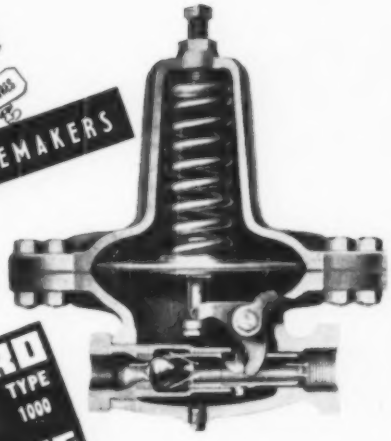
2. Moody, J. E., "Industry and Welfare Benefits," *ibid.*, pp. 18.

Reprints of this report are available at 45 cents per copy. Address the Editorial Department, *Chemical Engineering*, 330 West 42nd St., New York 18, N. Y.

GET RID OF THESE TROUBLEMAKERS

Many Businesses Do by Installing the . . .

CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000



Check THE NUMBER BEFORE EACH OF THE FOLLOWING USER'S STATEMENTS AGAINST THE 10 POINTS LISTED

1. A manufacturer checks 6 of the points and says, "Installed the '1000' on our fuel burning equipment and HAS GIVEN ENTIRE SATISFACTION."
2. A chemical company checks 6 of the points and says. "We have operated two of your CASH STANDARD Streamlined Type '1000' Pressure Reducing Valves in our plant for eighteen months with NO MAINTENANCE OR ADJUSTMENT REQUIRED."
3. A lumber company checks 3 of the points and says. "We use this valve to REDUCE THE PRESSURE from our boilers to the office where we use this steam from the boilers to heat the office. We have USED THIS VALVE FIVE YEARS and it has NEVER GIVEN ANY TROUBLE."
4. A machine works checks 9 of the points and says, "We have had NO TROUBLE with the '1000' valves now in use on our preloading unit."
5. A laundry checks 7 of the points and says. "It is a GOOD TROUBLE-FREE, TIGHT CLOSING, COST-SAVING VALVE with PRACTICALLY NO MAINTENANCE."
6. A motor manufacturer checks 4 of the points and says. "Valve used in Research Dept. for VARIOUS TEST PRESSURES THAT MUST BE MAINTAINED regardless of upstream pressure changes."
7. A boiler and tank company checks 9 of the points and says. "We have in operation many CASH STANDARD Type '1000' Streamlined Valves and are pleased to state their PERFORMANCE HAS BEEN SATISFACTORY AT ALL TIMES."

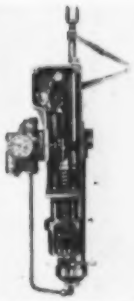
Send FOR BULLETIN 962.

1	2			5		7	POINT No. 1 **Maximum capacity when needed most.**
1	2		4		6	7	POINT No. 2 **Accurate pressure control under toughest working conditions.**
1	2	3	4	5	6	7	POINT No. 3 **Trouble-free service.**
1	2	3	4	5	6	7	POINT No. 4 **Smooth operation.**
1	2		4	5		7	POINT No. 5 **Tight closure.**
			4	5			POINT No. 6 **Speedier production results.**
			4	5		7	POINT No. 7 **Elimination of failures.**
			4	5		7	POINT No. 8 **Cost-saving operation.**
			4	5		7	POINT No. 9 **No spoilage.**
1	2	3			6	7	POINT No. 10 **Practically zero in maintenance.**

CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES
Send for them



Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.

Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.

Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

Organics From Natural Gas

METHANOL, formaldehyde and acetaldehyde are now produced by oxidation of natural gas components near Winnie, Tex., by McCarthy Chemical Co.

The rated maximum amount of feed gas handled by the chemical plant is 100 million cu. ft. per day. The gas first passes through conventional scrubbers where any absorbent oil entrained in the gas from the absorption plant is trapped and removed. The scrubbed gas is then discharged through a gas-fired tubular heater in order to reach the temperature required for the reaction with oxygen in the oxidation reactor.

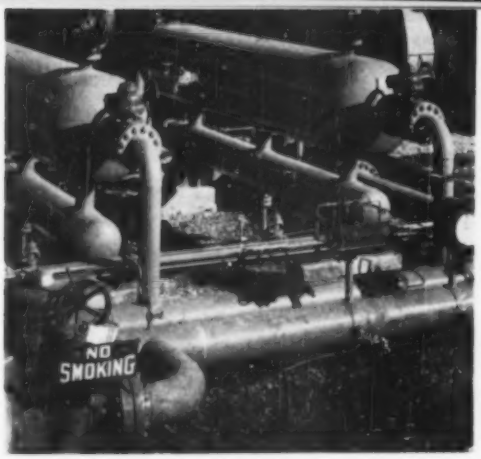
Oxygen of 90 to 95 percent purity is provided by a large low-temperature unit of Hydrocarbon Research process design. Like other units of this design the installation involves the liquefaction of air and subsequent fractionation of the product. The necessary compression is furnished by eight compressors. Refrigeration is secured by the substantially isentropic expansion of part of the air through an engine rather than by adiabatic expansion through a valve. In contrast to the piston-type engines which prevailed in earlier units built for the army, the engine used at Winnie is of the turbine type chosen for smoother operation. Power from the engine is utilized for process purposes. The bulk of the equipment in the unit is necessarily built of aluminum.

Oxidation products leaving the reactor flow to a conventional absorption tower utilizing water as the absorbent. Residue gases leave the absorber and enter a gas distribution system. The water solution is stripped of the chemical products in an ordinary still and product vapors leave the still and are condensed and fractionated.

The fractionating system for separation of the formaldehyde, acetaldehyde and methanol consists of the customary low-pressure bubble cap towers. Stainless steel is used in those portions of the fractionating system which are in contact with formaldehyde. A residue consisting of a water solution of salts of organic acids is withdrawn from the base of the fractionator where methanol and water vapors are being removed prior to their final separation.

Although some of the formaldehyde is produced directly from the oxidation process, the greater part is manufactured by oxidation of a portion of the methanol. The methanol oxidation step involves the usual equipment and catalyst employed in this process. The methanol is vaporized in a steam heater, combined with compressed air and passed through a converter containing metallic copper as the catalyst. The resulting mixture of unreacted methanol, formaldehyde, water and residual gases is cooled and passed into a primary separation tower where the gases are released. The mixture of formaldehyde, water and methanol is pumped to a second tower where formaldehyde is withdrawn from the base and sent to storage. The methanol from this tower, combined with any that is scrubbed by water from the residual gases, is recycled to the methanol vaporizer.

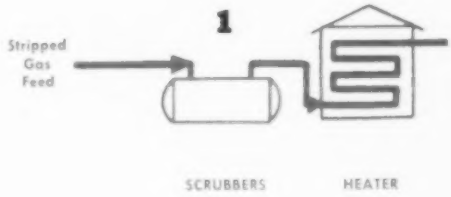
CHEMICAL ENGINEERING
January, 1949
PAGES 132-135



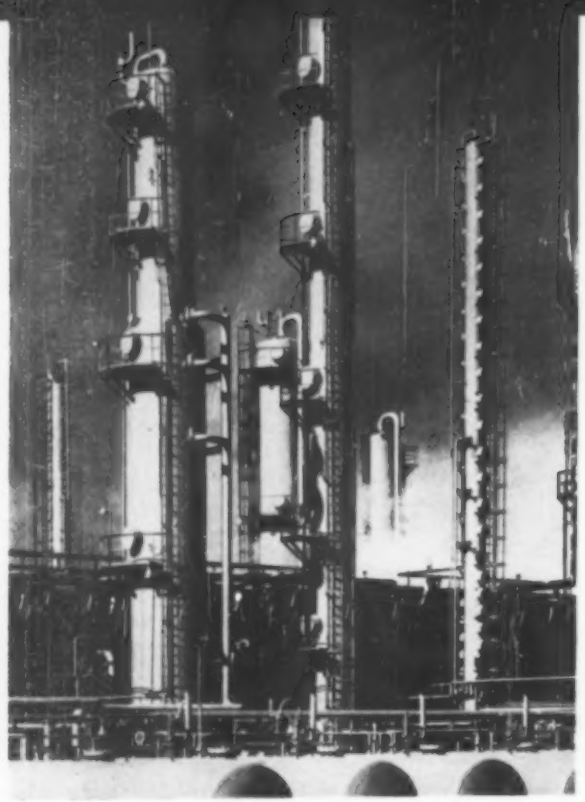
1 SCRUBBERS trap and remove the absorbent oil entrained in natural gas feed from absorption plant.

A CHEMICAL ENGINEERING PICTURED FLOWSHEET

ARTICLE ON PAGE 92

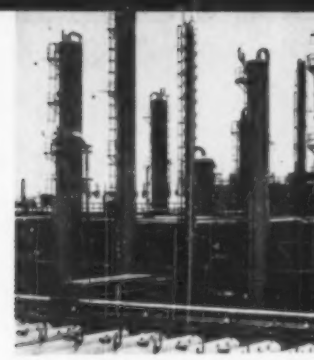


Oxidation of

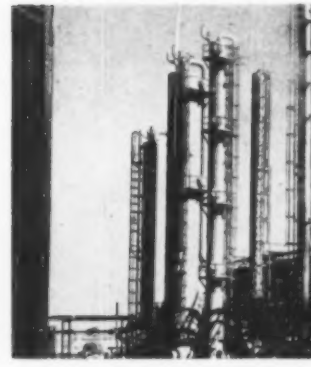


2 ABSORPTION TOWER to which the oxidation products leaving the reactor flow. Water is used as the absorbent.

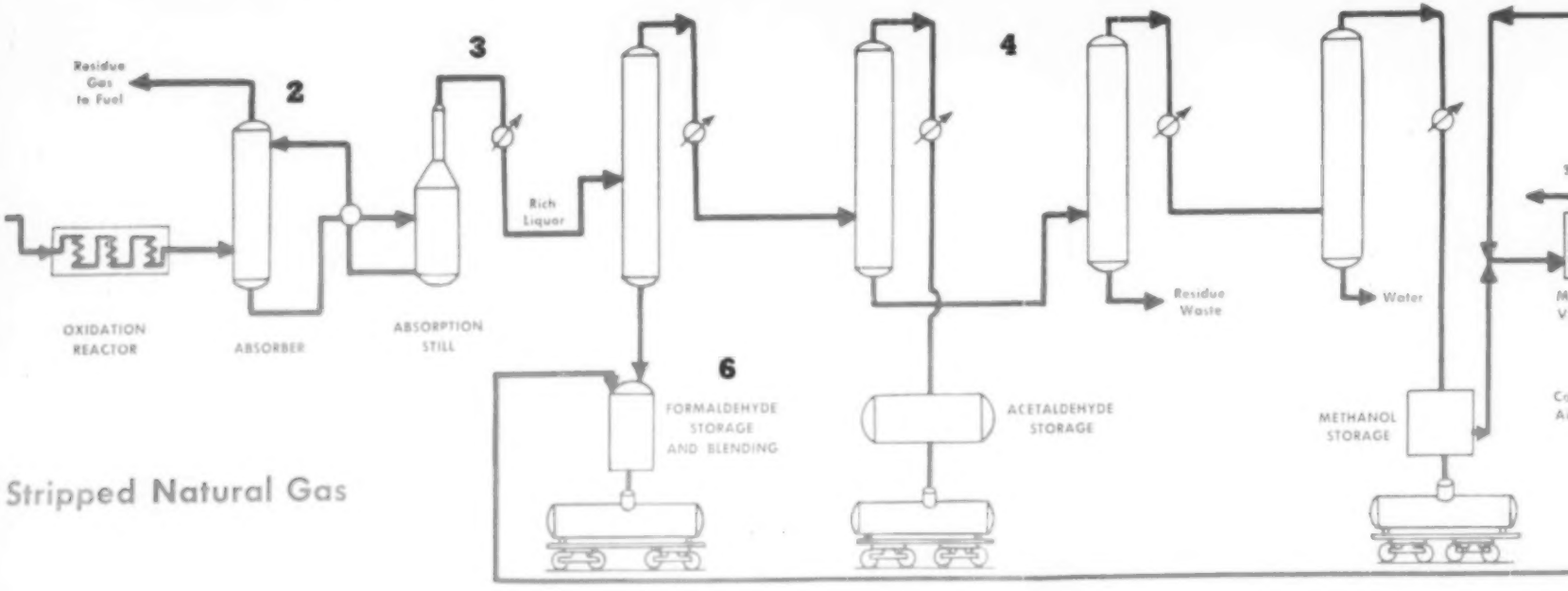
3 ORDINARY STILL is utilized for stripping of solution of chemical products. Product vapors leave still and are condensed.

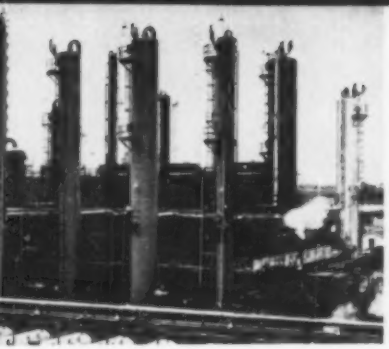


4 FRACTIONATION TOWERS sepa
acetaldehyde from rich liquor coming fr

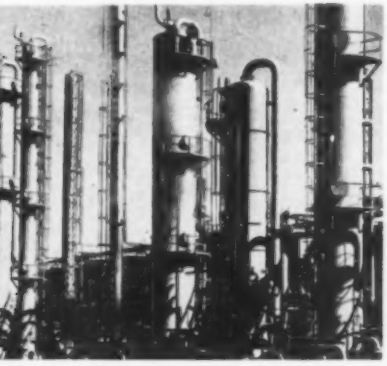


5 TOWERS in which formaldehyde i
methanol: finishing (center), separation

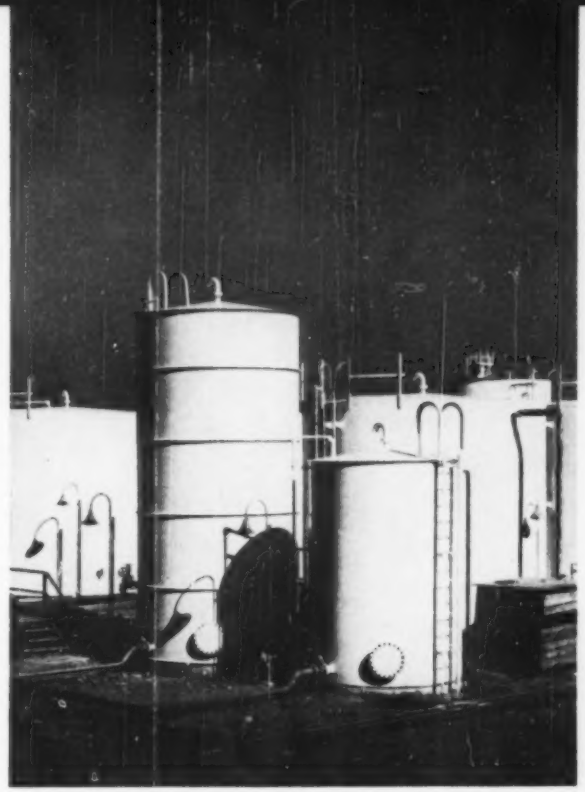




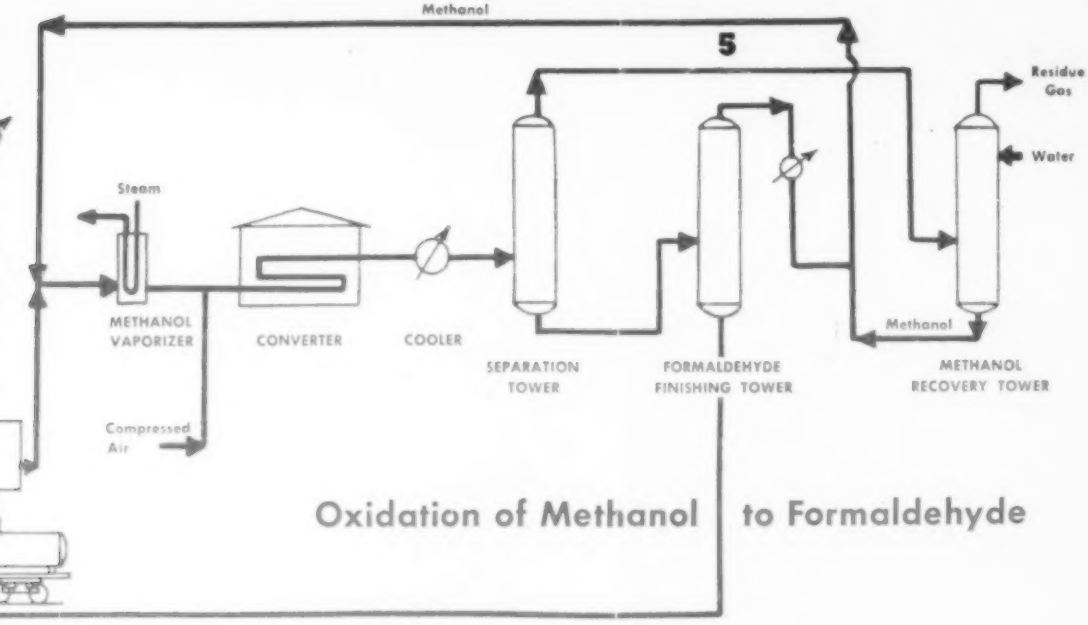
TOWERS separate methanol, formaldehyde and liquor coming from absorbtion still.



formaldehyde is also produced by oxidation of nter), separation (left), methanol recovery (right).

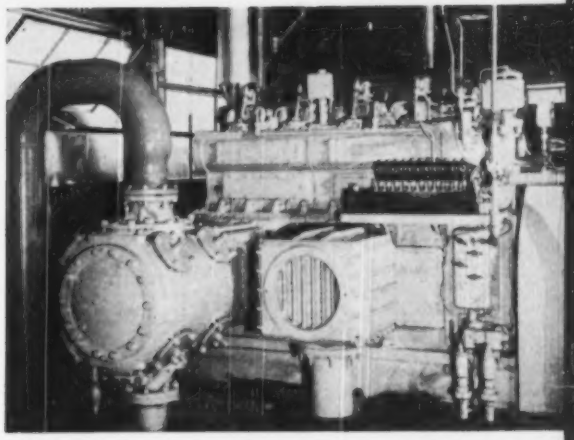


6 TANKS for blending and storing formaldehyde from both oxidation process and by oxidizing methanol.

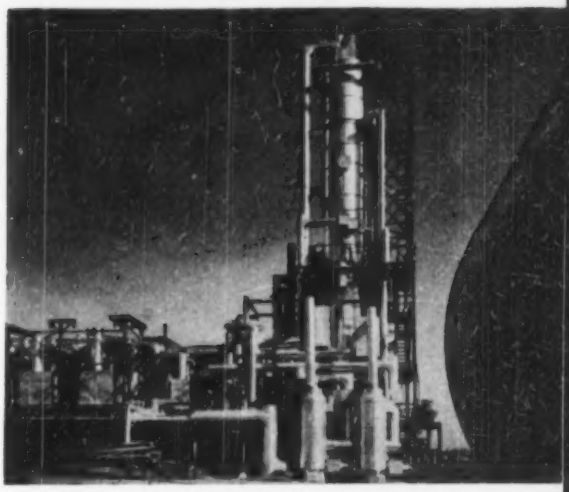


Oxidation of Methanol to Formaldehyde

Auxiliaries

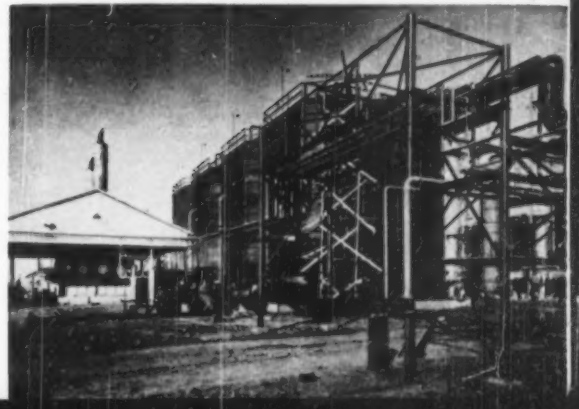


COMPRESSORS furnish air for the oxidation of methanol to formaldehyde. It goes directly into the converters.



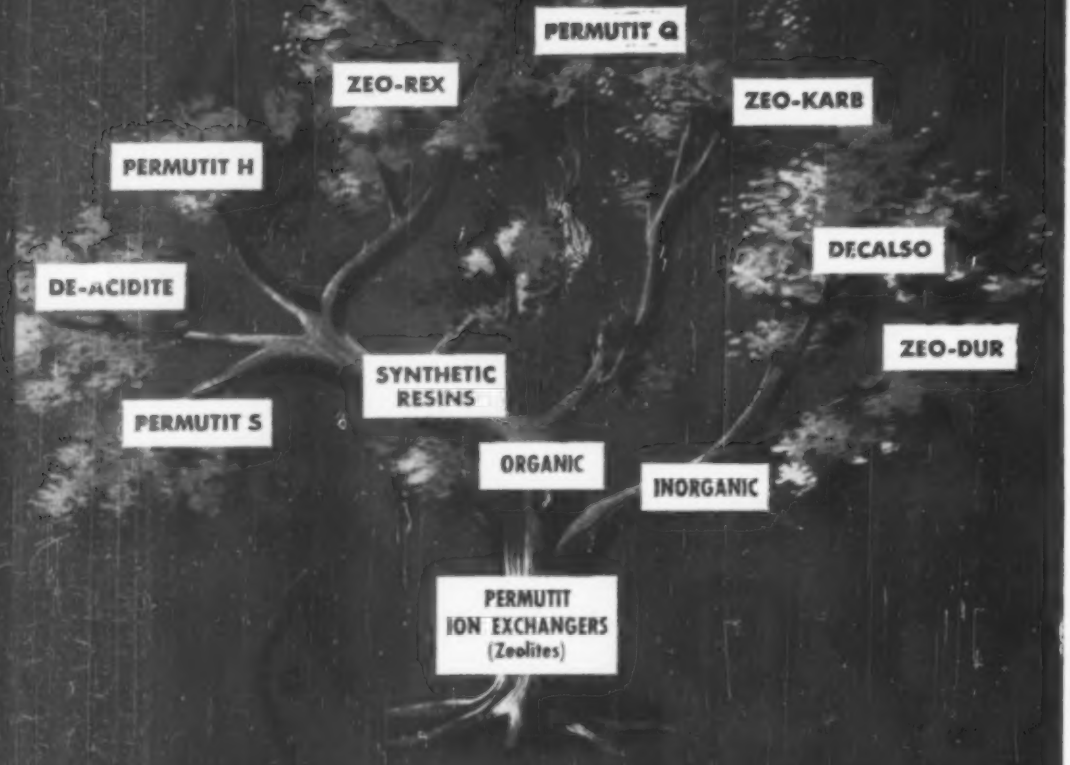
OXYGEN UNIT shown here supplies oxygen for the oxidation reactor in the Winnie, Tex., plant of McCarthy Chemical Co.

COOLING TOWERS for part of operations. Water pumps (left) operate in connection with the water used on the towers.



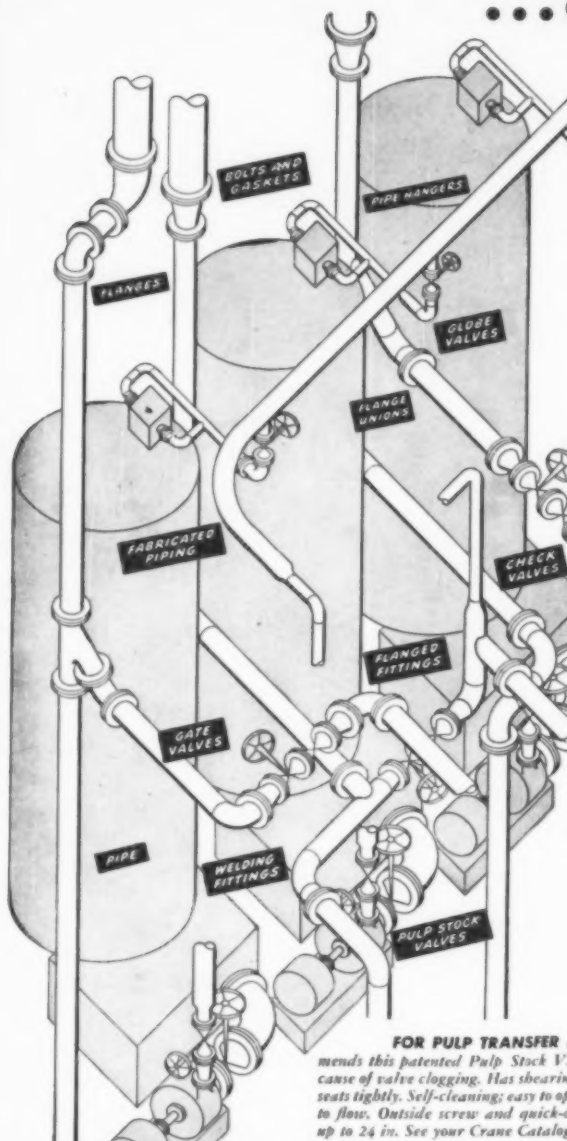
We're proud of

OUR FAMILY TREE



Permutit

For widest choice of pipi



FOR PULP TRANSFER

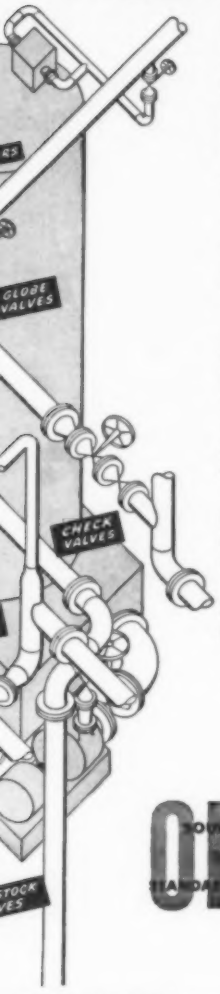
mends this patented Pulp Stock V
cause of valve clogging. Has shearin
seats tightly. Self-cleaning; easy to o
to flow. Outside screw and quick-
up to 24 in. See your Crane Catalo

EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
AND HEATING

CRA

f piping equipment
. . . get it from CRANE!



Take a bleach plant, a refinery, or extraction plant, for example. All the piping equipment for these or any chemical process operations can be had from Crane: valves, fittings, pipe line accessories, and pipe—in brass, iron, steel, or alloys.

Complete selection is but one reason why so many process industries standardize on the Crane line. It's just one feature of the 3-way advantage of getting everything in piping from Crane.

ONE SOURCE OF SUPPLY helps to simplify all piping procedures—from specifying and ordering, to erection and maintenance. One catalog and one order cover everything for the job.

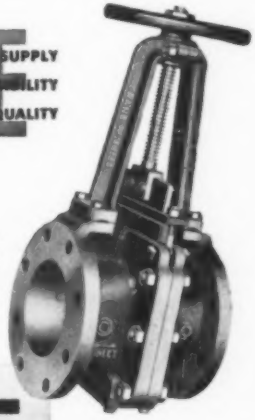
ONE RESPONSIBILITY for materials helps to get the best installation and to avoid needless delays.

OUTSTANDING QUALITY in every item from Crane means uniform efficiency and dependability in every part of piping systems.

Your local Crane Branch or Wholesaler is amply stocked to give you these piping advantages today.

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers
Serving All Industrial Areas

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



ULP TRANSFER LINES, *Crane recommended Pulp Stock Valve to eliminate the clogging. Has shearing-action disc; always self-cleaning; easy to operate; non-restricting type. Screw and quick-opening types in sizes 2" to 12". See your Crane Catalog, p. 375.*

CRANE

FOR EVERY PIPING SYSTEM

if it's a Pulverizing Problem Consult...

SINCE 1887

RAYMOND for the Answer

With over sixty years' specialization in pulverizing and separating machinery, Raymond offers a complete line of equipment for nearly every production requirement in the manufacture of powdered materials.

Capacities: From small Laboratory Units up to Super Roller Mills delivering 30 tons or more of product per hour.

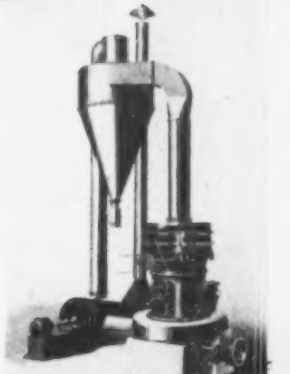
Fineness: Wide range classification from medium fine through intermediate grades up to 400-mesh materials with particle sized 95% to 99% finer than 5 to 10 microns.

Productivity: Pneumatic feed control maintains the maximum "load" that the mill can handle at all times . . . requiring no attention from the operator.

Economy: Modern design and time-proved construction . . . automatic lubrication and advanced operating features . . . all help to reduce maintenance and overall production costs.

Service: Raymond engineers are qualified by long experience to work with you in determining the proper equipment and methods of handling your problem.

Flash Drying
Raymond IMP MILL



Fine Grinding
Raymond ROLLER MILL

Air Separating
Whizzer Separator

COMBUSTION ENGINEERING—SUPERHEATER, INC.
RAYMOND PULVERIZER DIVISION
1311 North Branch Street, Chicago 22, Illinois

PROCESS EQUIPMENT NEWS

Theodore R. Olive, ASSOCIATE EDITOR

CONTENTS

Self-Priming Pump	139	Slurry Pump	148
Immersion Heater	139	Bin Aerator	148
Expandable Compressor	139	Corrosive Fluid Valve	150
Small Steam Trap	140	Five-Gallon Filler	150
Leak-Proof Valve Stem	140	Non-Sparking Blind Flanges	152
Metallic Filter Medium	140	Centrifugal Load Indicator	152
Motorized Speed Reducer	140	Hot Water Generator	152
Non-Frosting Gage	140	All-Metal Flexible Hose	152
Automatic Meter	142		
Extreme-Temperature Pump	142		
Pneumatic Controller	142		
Propeller Fan	142		
Jet Pump	142		
Motor Reducer	144		
Stroboscopic Flowmeter	144		
Density Recorder	144		
Dual Function Controller	146		

FOR MORE INFORMATION
See Reader Service
Coupon on pages 155-156

1. Self-Priming Pump

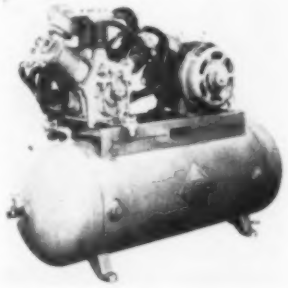
EXTREME simplicity, coupled with performance seldom claimed for pumps of this type, is incorporated in a new self-priming centrifugal pump developed by the Lawrence Machine & Pump Corp., 371 Market St., Lawrence, Mass. As the accompanying cross-section indicates, the pump consists of a double volute centrifugal, with discharge openings at opposite sides of the pump, with both the lower and upper discharges connected by passage-ways to the air separator above the pump chamber. In starting the pump, which initially must be filled with liquid, a stream of liquid is circulated from Port A through the air separator, and then through Port B back to the pump casing, and then to Port A. The stream entering Port A is heavily laden with air, since that part of the casing contains most of the air, and this air is separated from the liquid in the air separator where its velocity is reduced. The clear liquid is then returned to the pump casing through Port B and picks up another load of air during its passage from Port B to Port A.

This continues until all air has been exhausted from the suction line, the suction chamber, and the pump casing. After that the pump operates as a regular side-suction centrifugal pump. It has no valves of any kind and in addition to the air separator shown requires only a trap or suction chamber in the suction connection.

In tests conducted on the pump it is said to have been established that it can function as a positive air pump, acting both as a vacuum pump and as a compressor during priming, and as a regular centrifugal pump after it is primed. It has no close clearances, and can be used for pumping liquids containing solids or abrasive matter in suspension, the same as other centrifugal pumps. Either open or closed type impellers can be used. It is claimed that once primed, its performance is the same as that of a regular side-suction centrifugal pump of similar characteristics.

2. Immersion Heater

BUILT-IN thermostatic control for automatic heating is provided in a new 1,000-watt immersion heater offered under the name of Chill-Chaser by the Still-Man Co., 433 East 164th St., New York 56, N. Y. The thermostat is adjustable to maintain any desired temperature within 1 deg. F. tolerance. Five immersion lengths from 5 to 20 in. are available in an acid-resisting stainless steel. Units operate on standard a.c. current.



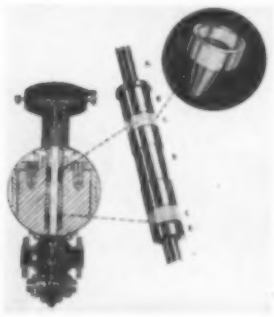
3. Expandable Compressor

USING only 18 principal parts, a new line of compressors comprising 48 different models of one, two, three, four or six cylinders, in single- and two-stage types, has been announced by the Air-Flo Compressor Co., Akron 7, Ohio. This is said to be the largest number of models ever made from one standardized set of

parts. All parts are interchangeable from the smallest to the largest compressor, which means that it is possible to purchase the size suitable for immediate needs and as requirements for air expand, to buy additional parts and increase the compressor's capacity (or pressure). Compressors are available in sizes from ½ to 40 hp., with 2.5 to 275 cfm. capacity at 30 to 300 psi., in vertical, V-type or side-angle construction, with single, twin or radial staggered cylinder arrangements.

4. Small Steam Trap

FOR PRESSURES up to 150 psi., where the advantages of an inverted bucket trap are necessary, Strong, Carlisle & Hammond Co., Cleveland, Ohio, has developed a new small steam trap designated as No. 070. This trap features a renewable seat, seamless deep-drawn stainless steel bucket, no welds, over-sized ports, and increased flow capacity. It is suitable for draining small industrial equipment supplied with steam heat at rates up to 150,000 Btu. per hr.



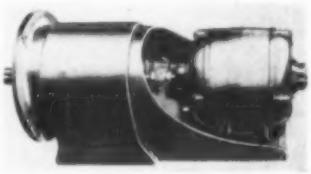
5. Leak-Proof Valve Stem

REPLACING the conventional packing box used on diaphragm motor valves, the Hammel-Dahl Co., 243 Richmond St., Providence 3, R. I., has developed a frictionless, leak-proof method of packing valve stems, which employs a scientifically shaped inert plastic seal. The control valve stem is hermetically sealed by the force of the system pressure. Therefore, no take-up or adjustment on the seal is necessary. It is claimed to be inherently lubricated and completely resistant to chemical attack. In the accompanying view, Part A is a super-finished plug stem; Part B the gland follower; Parts C, the new plastic seal; Part D the gland; and Part E the lower gland. The lower lip of the seal is unsupported and subject only to system pressure which seals the lip against the super-finished valve stem. After two years of continuous field tests at pressures up to 8,500 psi. it is claimed that there has been no case of replacement or failure of the new seal.

6. Metallic Filter Medium

KNOWN as Neva-Clog, a new metallic filter medium of unique design is being offered by the W. S. Rockwell Co., Fairfield, Conn. The medium consists of two precision-perforated metal sheets welded together. The holes of the upper sheet are positioned above the solid areas of the lower sheet so that the edges of the upper holes just miss touching the edges of the lower holes. The filtrate, draining down through from the slurry above the filtering surface, passes through the peripheries of the openings of the upper sheet, through the space between the sheets and through the holes of the lower sheet. The holes are about 0.045 in. in diameter and spaced to provide about 120 holes per sq. in. The medium is said to be completely non-plugging since solid particles cannot wedge in the open areas. Corrosion is said to be less damaging than with other media. The material can be supplied in any required form, such as flat, rolled or in special shapes. It is made in various metals and standard double thicknesses of 0.01 in. per sheet, with sheets of 0.008 and 0.005 in. also available for special conditions.

This same company has developed a new butterfly valve with both body and vane entirely covered with latex rubber and with a stem of Hastelloy. The valve body is made especially thin to fit into close spaces between connecting pipe lines. Sizes range from 4 to 72 in. in diameter, with operating pressures below 25 psi. as standard. However, valves can be designed for pressures up to 100 psi.



7. Motorized Speed Reducer

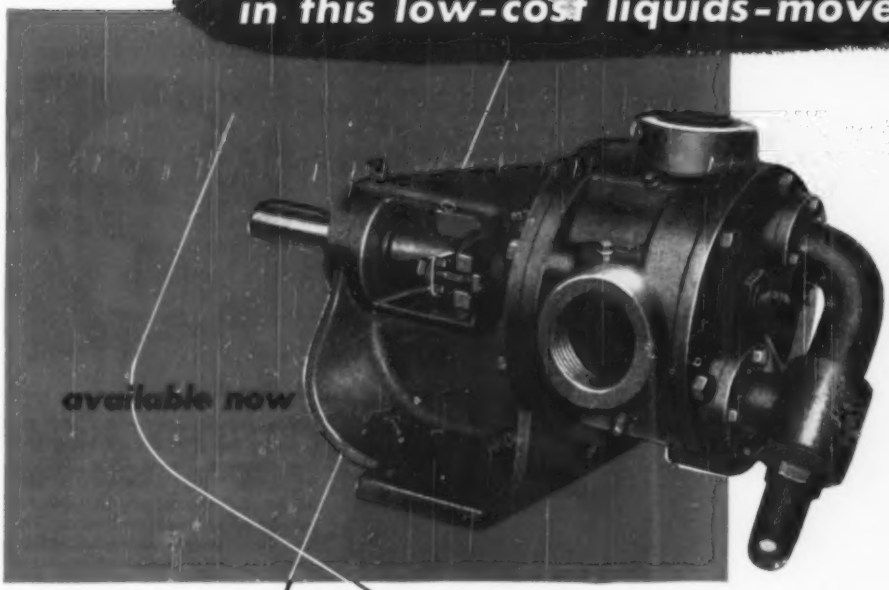
GIVING it the name of Series E, the Falk Corp., Milwaukee 8, Wis., has introduced a new line of all-steel motorized speed reducers employing a lighter yet stronger housing, a newly developed dirt-proof and moisture-proof seal to protect gears and bearings, and other features adding to appearance, efficiency and adaptability to a variety of requirements. The complete line includes horizontal and vertical units, in both integral and all-motor types, for floor, wall, or ceiling mounting. The basic unit can be converted to a variety of other adaptations, including right-angle, V-belt, multi-speed, and others.

8. Non-Frosting Gage

A FLAT-GLASS liquid level gage for use in low-temperature operations, designed to prevent the accumulation of frost on the gage glass, has been announced by Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass. The gage is provided with a special transparent frost preventing unit sealed to the gage glass, which projects beyond the cover bolts so that frost cannot build up across the vision slot

only 2 parts move

in this low-cost liquids-mover!



Yes, there are only two moving parts in Fairbanks-Morse Rotary Pumps. These exceptionally compact liquids-movers, with their simplicity of design, bring you low-cost pumping at high efficiency. A precision-cut rotor and pinion do all the work. There are no complicated parts to cause trouble . . . no worries about suction leaks . . . no vapor locks.

Mixing tanks, laundry and dry cleaning machinery, machine tools, wherever you use one of these positive acting pumps, you can be sure of definite rated output. There is a constant pumping action . . . no vibration or shocks to affect pump life. Most sizes and modifications are available from stock. Fairbanks, Morse & Co., Chicago 5, Illinois.

when it comes to pumps . . .

FAIRBANKS-MORSE

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES
MOTORS • GENERATORS • STOKERS • MAGNETOS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT

in the cover forging. It is claimed that the new design not only insures against frosting, but gives a higher accuracy of reading as compared with the approximate readings obtained through the use of frost plugs. The gage is made in both the reflex and transparent types, and is suggested for applications in refineries, recycling plants, and a variety of chemical industries.

9. Automatic Meter

An industrial meter designed to replace volumetric measuring tanks for liquid batching operations is being offered by the Buffalo Meter Co., 2905 Main St., Buffalo, N. Y. This meter, which is of the positive displacement type, has electrical contacts which control the total volume of liquid which passes through the meter, thus regulating the amount in a given batch by shutting off the valve when the pre-determined flow has passed. The device is said to save time as compared with measuring tanks in that the meter computes the liquid amount in less time than a tank can be filled.

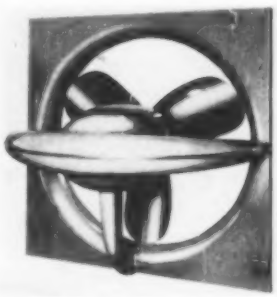
10. Extreme-Temperature Pump

For the pumping of liquids under extremes of temperature, the Byron Jackson Co., Terminal Annex, Box 2017, Los Angeles 54, Calif., has developed the Type SM single-stage and double-stage process pumps. These pumps will handle hot oil, evaporator condensate, propane, process liquors, butane, gasoline, Dowtherm, acids, and hot-water circulating systems. They are also suitable for cold evaporation processes. The design is such that all component parts are free to expand and contract without disturbing alignment, while internal joint leakage and resultant corrosion are said to be reduced materially by having no internal case joints exposed to differential pressures. An extra deep water-cooled stuffing box is provided, with in-and-out sealing oil connections, renewable throat bushings and a quenched cowl type gland.

This concern has also introduced the Type VMT pump for handling either hot or cold liquids, corrosive or non-corrosive, where the net positive suction head is limited. This is a vertical multi-stage pumping unit mounted in a barrel from which it takes suction. The base of the pump is at ground level, eliminating usual costs involved in raising the vessel or excavating an elaborate pit to lower the pump. Pumps are available in four sizes from 8 to 14 in. diameter of the barrel, with capacities to 1,000 gpm., heads up to 250 psi., and for temperatures to 250 deg. F. Pumps for larger capacity and temperatures to 750 deg. can also be supplied.

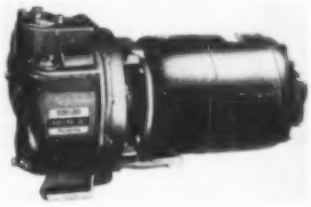
11. Pneumatic Controller

For use in plants that prefer pneumatic controllers combined with an electrical measuring system, the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa., has announced a new balance type controller incorporating proportional action, automatic reset and derivative or rate action. The electrical measuring end employs a null balance type of circuit, either a potentiometer or a wheatstone bridge, to measure temperature, conductivity, pH or SO_2 content. For temperature measurement, either a thermocouple or a radiation pyrometer can be employed. To match the balance type characteristics of the measuring end, the pneumatic control end also uses balance principles in a non-bleed booster which amplifies the nozzle pressure changes some ten times by means of bellows on a balance arm. The resulting instrument is said to provide a complete, coordinated system which can be tuned accurately to the requirements of any type of process or can readily be switched to manual control without delay or "bump." The controller is said to provide for faster start-up of processes, smaller swings due to process up-sets, no process drift, and shorter turn-around time when processes must be shut down for repair.



12. Propeller Fan

For applications where both appearance and efficiency are important, the American Blower Corp., Detroit 32, Mich., has introduced a new Model A Ventura propeller fan for exhausting air, fumes and odors. The fan incorporates numerous refinements in design and construction, as well as in styling. It employs a square mounting panel which is easily installed and a streamlined motor inclosure, with smooth, easy-to-clean surfaces. The streamlined inlet is said to provide substantial savings in power.



13. Jet Pump

For low capacities up to 35 gpm., at relatively high pressures up to 190 psi., Goulds Pumps, Inc., Seneca Falls, N. Y., has developed a new

designer, builder, lessor of tank cars- GENERAL AMERICAN

No matter where a GATX car rolls, it's never far from one of the many General American Maintenance Shops. These strategically located shops keep the cars used by General American's customers rolling.

GATX GENERAL AMERICAN

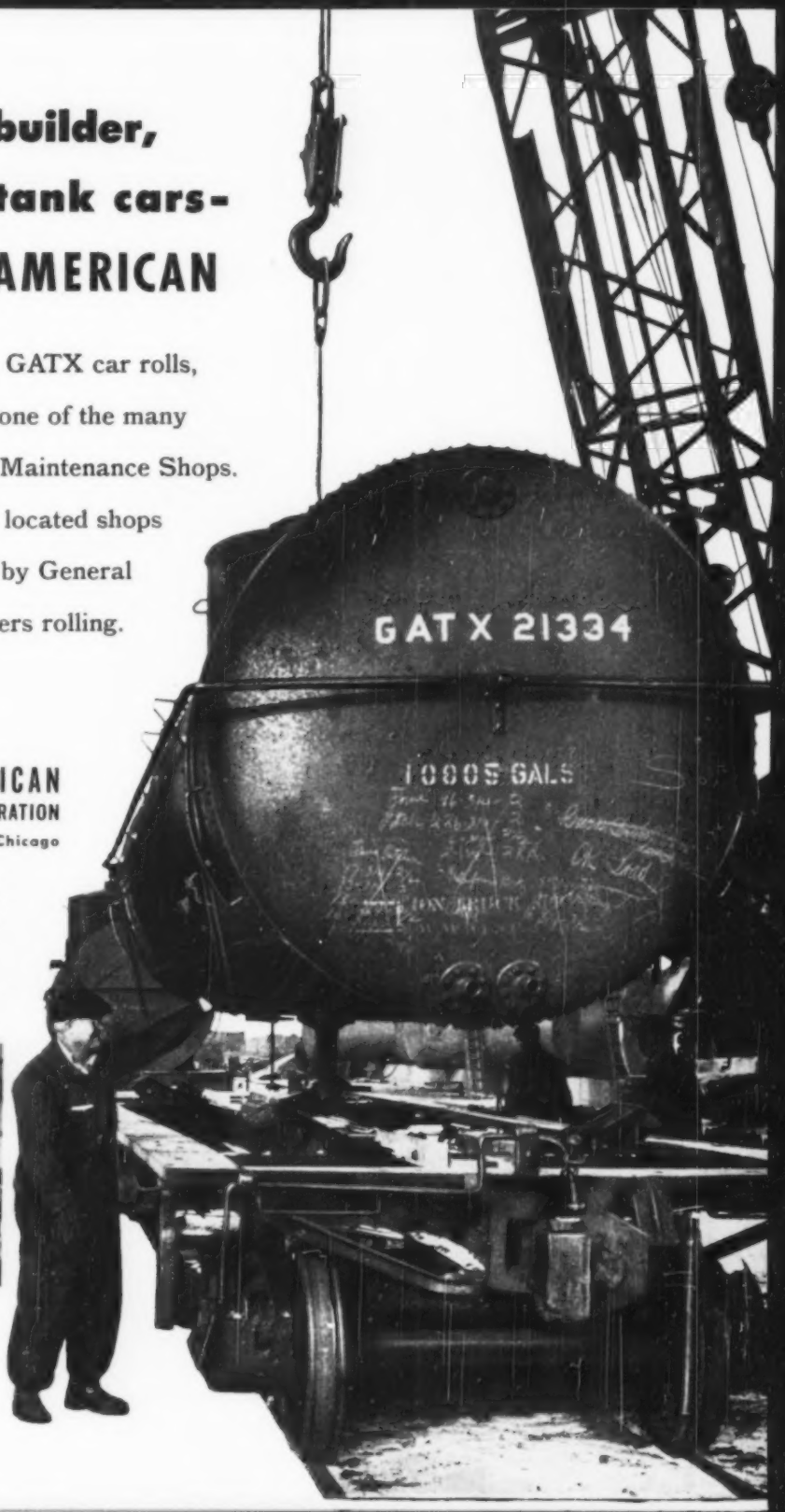
GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street · Chicago

District Offices: Buffalo • Cleveland • Dallas • Houston • Los Angeles • New Orleans • New York • Pittsburgh • St. Louis • San Francisco • Seattle • Tulsa • Washington

Export Dept., 10 East 49th Street, New York 17, New York

In cooperation with the railroads, experienced record-keeping and traffic control distribute more than 40,000 GATX cars to meet shippers' special and seasonal requirements.



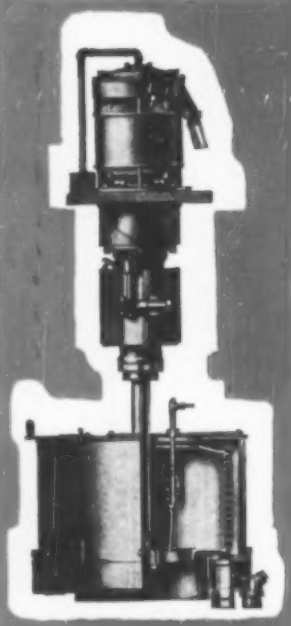
CENTRIFUGALS

If your centrifugal requirements preclude the use of "standard" machines, investigate the Roberts Fluid Drive Centrifugal. *This machine can be built to do your job.*

★

Only in the Roberts Fluid Drive Centrifugal are these features to be had:

- Standard motor, with current peak less than 40% of direct connected (special) motor drives.
- Torque application uniform and adjustable.
- Simple adjustment for accurate speed control.



Let us show you how these exclusive features can be made to work for your benefit. Your inquiry imposes no obligation.

ROBERTS

The WESTERN STATES MACHINE COMPANY
HAMILTON, OHIO, U. S. A.

line of pumps combining centrifugal and jet principles in one unit and known as the Industri-Jet. The pump is suitable for handling cold or hot water, alcohol, kerosene, carbon tetrachloride and similar liquids. It is self-priming, and cannot vapor lock. It handles both wet and dry liquids and is provided with a mechanical seal which is self-adjusting for wear and requires no lubrication.

14. Motor Reducer

ANNOUNCED originally some 18 months ago, the axial-air-gap motor introduced by Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago 5, Ill., is now available as a motorized speed reducer. Owing to the fact that the "pancake" motor resulting from this construction is less than half the size of a conventional motor, and weighs less by about one-third, it is possible to build the motor on to a speed reducer so that the combination is hardly larger than a conventional motor alone. It is available in ratings from ½ to 10 hp., and employs two ratios of single helical gears arranged in simple gear trains. The output shaft is concentric with the motor shaft. The machine is suitable for horizontal mountings, preferably on a level floor, but provision can be made for wall, ceiling or angle mounting, provided the shafts remain horizontal.

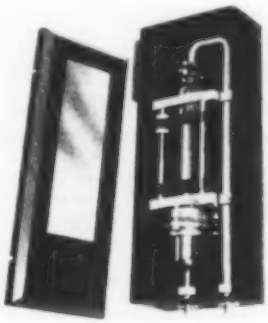
15. Stroboscopic Flowmeter

A NEW flowmeter which measures the velocity of flowing liquids and gases in a pipe by stroboscopically measuring the speed of rotation of a light turbine wheel has been introduced under the name of Stroboflow by the Flowmeter Corp. of America, High Falls, N. Y. Assuming that the volume of fluid delivered by a pipe in a given time is the product of the cross-sectional area of the pipe and the velocity of the flowing liquid, the instrument is said to read correctly

FOR MORE INFORMATION
See Reader Service Coupon on pages 155-156

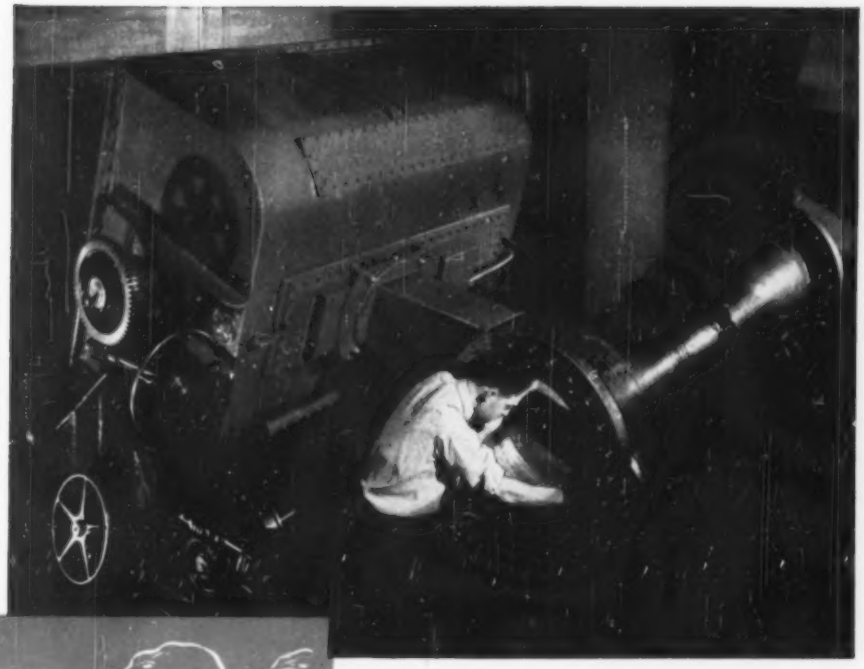
at all times, regardless of changes in temperature, gravity, pressure or viscosity. It consists of a velocity indicator and a variable frequency generator.

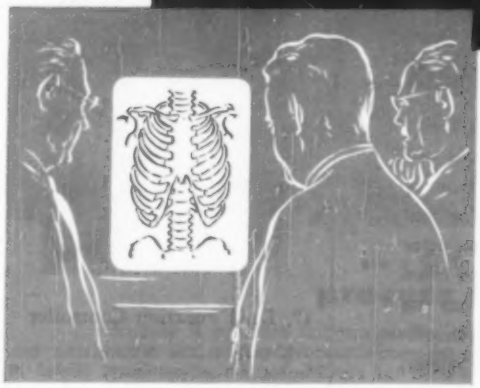
The first of these is a compact unit weighing less than 2 lb. which is connected in series with the piping. It contains a light molded impeller driven by fluid issuing from a calibrated nozzle. A stroboscopic light plays on the impeller disk. The light is powered by a variable frequency generator calibrated directly in flow units. In use the pointer of the variable frequency generator is moved across the dial until the aperture in the rotor disk appears to be a stationary, semi-circular band of light. At this point the rate of flow is read directly on the generator scale. The size at present available has a capacity range from 0.2 to 20 gpm., for pressures up to 3,000 psi.



16. Density Recorder

SENSITIVITY beyond that of earlier methods of density indication is claimed for the new Densitrol offered by the Precision Thermometer & Instrument Co., 1434 Brandywine Street, Philadelphia 30, Pa. The instrument operates on a hydrostatic principle, employing a totally submerged plummet which lifts a chain, one end of which is fastened to a reference point. The plummet is so weighted as to support half the weight of the chain when it is at the midpoint of its indicating range. If the density increases, the plummet rises, but this rise is balanced by supporting a greater part of the weight of





Inspection of Alloy Piping

requires skilled specialists, too

Inspection of prefabricated alloy piping requires specialists as skilled in their jobs as the experienced medical specialist.

Alloy piping inspection must make sure that: (1) Welds are sound and pressure tight; (2) Thinning of pipe wall in bends is avoided; (3) Metal has not deteriorated in fabrication; and (4) All metallurgical and physical specifications have been complied with. Strength tests, metallurgical examination, chemical analysis, radiographic examination for internal flaws, magnetic flux tests for surface defects, fluorescent penetration inspection . . . these are some of the tests often required to determine that the job is right.

Elaborate, costly equipment and highly skilled, highly specialized personnel are needed. Qualified Pipe Fabricators have plenty of both . . . another reason they produce better alloy piping at a saving of time, money and trouble.

THE PIPE FABRICATION INSTITUTE

Devoted to the Technical and Economic Problems in Piping

1108 CLARK BUILDING • PITTSBURGH, PA.

Read
the latest on
dust
RECOVERY

fly-away dollars

and how to trap them is the subject of Buell's 32-page catalog on dust recovery. It tells you why only Buell offers you a *fractional* efficiency guarantee. It's the only kind of guarantee that *accurately* and *reliably* predicts dust collector performance. The performance figures are often surprisingly high, for the Buell system has the patented van Tongeren 'shave-off'. It's an efficiency 'plus' found only in Buell's large diameter, non-clogging cyclones. Don't miss this factual booklet on planning dust recovery installations. Write today to the Buell Engineering Company, 18 Cedar Street, New York 5, N. Y.

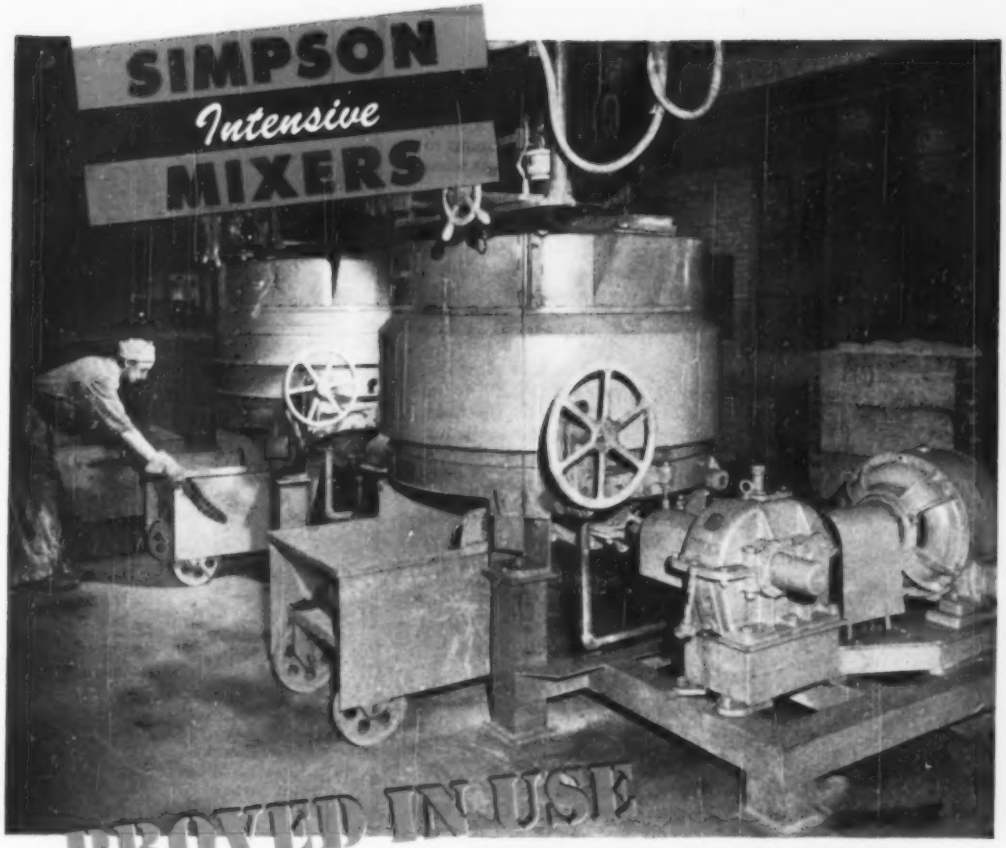
buell
Engineered Efficiency in
DUST RECOVERY

the chain so that for each density there is a definite equilibrium point for the plummet. The position of the plummet is measured by an inductance pick-up of the three-winding differential transformer form, and converted into a scale or chart indication.

The plummet action is completely without friction. Although there are several standard construction materials available, not only glass, but almost any machinable material may be used in building the parts in contact with the liquid. The instrument may be provided without temperature compensation, with manual compensation, or with completely automatic compensation, depending on the type of indicating mechanism employed. Direct reading and remote indicating types are available, as well as controlling and recording types. Practically any density range can be provided within the limits between 0.6 and 3.5 density.

17. Dual Function Controller

Known as the Auto-Selector controller, a new instrument offered by the Foxboro Co., Foxboro, Mass., is designed to control selectively either of two related variables by positioning a single valve, damper, or other control device. This selection is determined by the variable having the greater tendency to exceed its pre-set limit. The instrument automatically transfers control smoothly and instantly. It thus does the work which previously required two controllers, and may incorporate any type of control characteristic or any combination of such characteristics. Typical applications include controlling either the discharge pressure or the suction pressure of a pump in accordance with supply and demand requirements; or control of the fuel supply to an oven or furnace to maintain a desired temperature, while keeping the temperature below a safe limit. Unlike but



. . . on hundreds of chemical-process mixing problems!

Because it provides uniform results, the "controlled mixing" process accomplished by Simpson Intensive Mixers has become an integral part of mixing operations involving dry, semi-plastic and pasty materials requiring rapid, thorough, and uniform mixing and blending without grinding. The smearing, rubbing, and kneading action of these dependable mixers quickly develops maximum bond strength and plasticity in a mix.

Some of the product applications where Simpson Intensive Mixers are being used successfully include *boiler compounds, carbon electrodes, catalysts, crayons, crucibles, glass batching, graphite products, mercury reclamation, paper coatings, pencil leads, putties, silicon carbide refractories, soaps, special shape refractories, storage battery plate pastes, and welding rod coatings.*

Ask to have a National Engineer analyze your specific mixing problems.

SIMPSON Intensive MIXER

NATIONAL *Engineering Company*

604 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Barrie & Co., Pty., Ltd. Sydney, Australia

Teach fire prevention of course ...but be sure you have modern fire protection by

All the training, all the good housekeeping requirements are necessary. Even then . . . a stray spark or short circuit just seems to happen . . . a fire starts. That's when you need modern, quick-acting C-O-TWO fire protection. C-O-TWO is dry, clean carbon dioxide gas . . . snuffs out the fire in seconds, then disappears without a trace. It is non-contaminating, non-damaging, non-conducting and non-corrosive.

There are areas in your plant that particularly need C-O-TWO fire protection: spray booths, dip tanks, solvent baths, electrical equipment enclosures, lift trucks, pump rooms, anywhere there's danger of flammable liquid or electrical fires. For complete fire protection in enclosed areas such as record vaults and store rooms, install the new C-O-TWO Combination Smoke Detecting and Fire Extinguishing System. This new system is a 24 hour a day automatic watchman.

Let an expert C-O-TWO Fire Protection Engineer advise you on your fire protection needs now, before fire strikes. Just clip this advertisement to your letterhead or calling card and mail for complete information about modern C-O-TWO Fire Protection Equipment. Remember fire doesn't wait . . . act now!

C-O-TWO
INDUSTRIAL SMOKE DETECTING CABINET

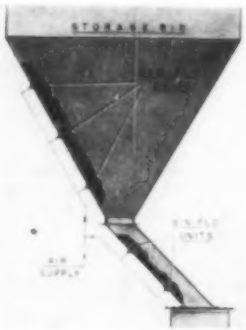
C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY
Sales and Service in the Principal Cities of United States and Canada
AFFILIATED WITH PYRENE MANUFACTURING COMPANY

related variables can also be controlled, such as the outlet temperature and steam pressure in a heat exchanger.

18. Slurry Pump

ANY MATERIAL that will flow through a pipe, it is claimed, can be handled with the new Roto-Flo pump manufactured by the Roto-Flo Pump Corp., 249 North Water St., Milwaukee 2, Wis. Some of the materials being handled include fleshings in the tanning industry, paper pulp stock, paint and varnish ingredients, and sewage sludge. The basic elements of the pump include a hopper and revolving blades. As the rotor revolves, the blades pass under the hopper where they are consecutively loaded, then carry material around to the discharge. At this point the blade retracts within the rotor as it passes a scraper plate. The material is scraped into the discharge opening and forced through the pipe.



19. Bin Aerator

TO PROVIDE uniform steady flow of bulk materials from bins, hoppers, and chutes, the Bin-Dicator Co., 14615 East Jefferson Ave., Detroit 15, Mich., has announced Bin-Flo, a new aerat-

Our Service Does NOT End At Your Doorstep

You order your chemicals . . . and we deliver them. *BUT* General Chemical's service does not stop at your doorstep. Our Technical Service Organization, for example, has been created solely to help General Chemical customers solve their problems involving the handling, storing and use of chemicals.

This is not a group of "ivory tower" consultants, but a staff of practical men who will work with you confidentially—in your own plant if necessary—until your questions are answered. They may not know everything about your business, but they do know our chemicals and can help you get the best use out of them in your operations.

That is why General's Technical Servicemen so frequently offer suggestions and ideas that point the way to new efficiencies and economies in production and research operations.

Remember—General's Technical Service staff is yours to utilize. Just advise the nearest General Chemical office when you need such assistance.

BASIC CHEMICALS

GC

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

NOW READY . . . for immediate use or for your blower data files

Essential data at your finger tips—if you use blowers, you need the data in this new booklet.

Shows details of operating principles, design and construction, along with typical installation views illustrating a wide variety of industrial applications.

Gives helpful data and information, including characteristic curves covering capacity and horsepower, to help you in selecting equipment to meet your specific requirements—based on almost a century of specializing in blowers.

Ask for Bulletin 22-23-B-13. No cost or obligation.

ROOTS-CONNERSVILLE BLOWER CORPORATION
901 Illinois Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

BLOWER BUILDERS SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

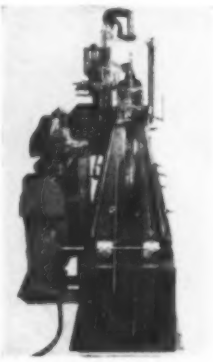
• • ONE OF THE DRESSER INDUSTRIES • •

FOR MORE INFORMATION
See Reader Service Coupon on pages 155-156

ing device which injects low-pressure air into the material through a special fabric diffuser, causing the material to flow freely. This unit is a small plate, 3¾ in. x 7½ in. x ½ in. thick, which is readily located at points where flow is restricted. The unit, it is claimed, will not clog up, even with the most finely ground material. Models are provided both for thin-walled bins and chutes, and for concrete and other thick-walled hoppers.

20. Corrosive Fluid Valve

POSITIVE assurance of tight shutoff, despite corrosive action or deposits on the valve parts, is claimed for a new valve for corrosive fluids introduced by Sellers Injector Corp., 1605 Hamilton St., Philadelphia 30, Pa. The valve has a number of unique features, including a self-cleaning action, multiple seat design, and injection sealing for emergency conditions. It is built in sizes from ¼ to 10 in., and is said to be suitable for hot acids, strong or highly corrosive solutions, as well as hydrocarbons and other penetrative fluids. In tests involving the use of more than 500 of these valves over a five-year period in a large oil refinery, handling hydrofluoric acid and other corrosive fluids, it is claimed that tight shutoff was always possible, regardless of how often the valves were operated, or the type of fluid handled.

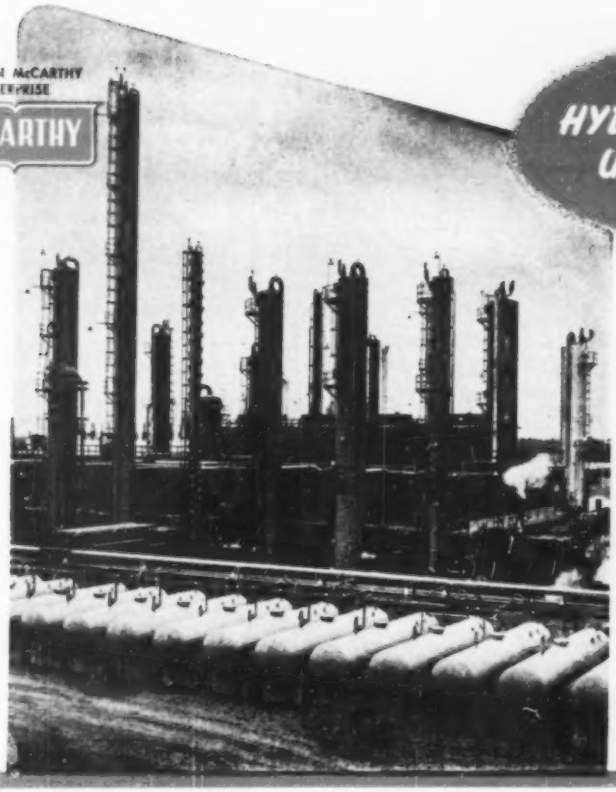


21. Five-Gallon Filler

VIRTUALLY automatic, a new six-spout, air-operated filler for 5-gal. containers has been put on the market by

A GLENN McCARTHY ENTERPRISE

McCARTHY



HYDROCARBONS UNLIMITED

...to meet the needs of Industry

NOW AVAILABLE

Formaldehyde
Methanol
Acetaldehyde

McCARTHY CHEMICAL COMPANY
WINNIE, TEXAS

At Winnie, Texas, in the heart of the great natural-gas fields of the Gulf Coast, McCarthy Chemical Company is now producing vital organic chemicals in unlimited quantities to supply the ever-increasing demands of industry.

The New Production Cycle

McCarthy Chemical Company completes the "production line" of raw materials from gas well to ultimate industrial user, all under the McCarthy shield — an accomplishment in gathering and processing that assures a stable and continuous flow of these needed chemicals from large basic reserves.

McCarthy-owned and operated facilities gather and deliver the natural gas; separate and process the hydrocarbons, and transport petro-chemicals to market in a fleet of specially-constructed tank cars.

Hydrocarbons Unlimited

Developments by the McCarthy companies today are sending more vital chemicals to market—and more, are making significant strides in the conservation of natural resources — converting yesterday's wastes into valuable petroleum and chemical raw materials through continuing research.

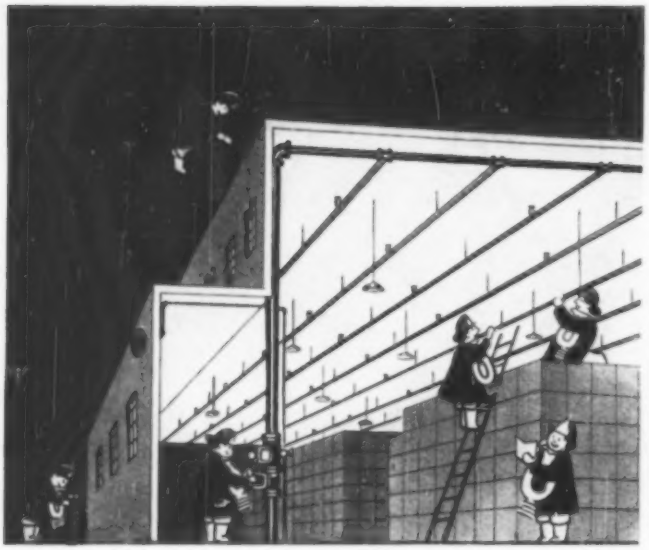
Prompt Delivery
in Commercial Quantities

- **Inhibited 37% Formaldehyde**
- **Uninhibited 37% Formaldehyde**
- **Methanol**
- **Acetaldehyde**

McCARTHY CHEMICAL COMPANY

G. M. McGRANAHAN, Vice-President and General Manager

SHELL BUILDING — HOUSTON, TEXAS TELETYPE HO-181 — PHONE: PRESTON 7204



INSPECTION SHEET No.888

INSPECTION SHEET No.008

Why Sprinkler Inspections Are All Important

YOU MAY HAVE the best sprinkler system available, but how sure are you of its readiness and ability to combat fire? After all, a sprinkler system, like any other mechanical device not properly maintained, may fail at its time of need. That could mean bad news to you, Mr. Property Owner. That's why you should know of the primary advantages of *Automatic Sprinkler* **Inspection Service.**

Realizing the vital importance of assured sprinkler system operation, *Automatic Sprinkler*, at the advent of its business some 55 years ago, established an **Inspection Service** Department. **Inspection Service,** which is handled only by individuals thoroughly familiar with all types of sprinkler equipments, actually augments periodic insurance bureau inspections and provides you with a double check on the general efficiency of your fire protection equipment.

Inspection Service detects minor irregularities and provides for correction before major repairs are necessary. It brings to your attention the need of extensions to your present equipment should property expansion so demand. In short, *Automatic Sprinkler* **Inspection Service** is an integral factor in every over-all fire safety program and its true value worth considerably more than is the small annual charge that is made for it.

Don't wait for fire to strike and then hope for the best. Be assured through **Inspection Service** that your fire protection will really protect, today—tomorrow—next week or whenever it is needed. "Automatic" Sprinkler Corporation of America, Youngstown 2, Ohio.

"Automatic" Sprinkler

FIRST IN FIRE PROTECTION

DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION

OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

MRM Co., 191 Berry St., Brooklyn, N.Y. An operator steps on a foot-operated air valve which raises and lowers the entire filling head. The conveyor brings the six containers into position and each spout is individually actuated by an air cylinder. After being filled, the conveyor carries the filled containers away and brings six additional containers into position. Filling is at the rate of ten per minute, with uniform results achieved by an automatic overflow.

Equipment Briefs

22. FOR USE on 3 to 8 in. pipe the Gatke Corp., 228 North La Salle St., Chicago 1, Ill. has announced the development of a line of non-metallic, non-sparking blind flanges which are molded to finished dimensions from fabric-reinforced plastic and are 80 percent lighter in weight than bronze. The flanges are tested to 400 psi. live pressure and are said to be proof against a variety of corrosive agents including 15 to 20 percent sulphuric acid.

23. ONE OF the new uses for its SR-4 resistance wire strain gages indicated by the Baldwin Locomotive Works, Philadelphia 42, Pa. is in the automatic control of centrifugal filters for dewatering fine coal. This application, made by the Bird Machine Co., South Walpole, Mass., employs a SR-4 Load Beam detector unit mounted as a cantilever on a bracket beneath the gear box of the centrifugal. The torque required to convey the coal through the filter is measured by the unit and applied to a Foxboro Dynalog recorder-controller which then controls the feed to the machine.

24. TO PERMIT the economical production of hot water for industrial or commercial uses, the Cleaver-Brooks Co., 326 East Keefe Ave., Milwaukee 12, Wis., has introduced a new water generator that is being made in two sizes, 550,000 and 730,000 Btu. per hr. This means either 665 gph. or 875 gph. at 100 deg. F. temperature rise. The new units are completely automatic and are produced for either oil or gas firing.

25. STRENGTH of steel, coupled with the non-sparking characteristics of copper, are available in a new all-metal flexible hose offered by the Pennsylvania Flexible Metallic Tubing Co., 72nd and Powers Lane, Philadelphia, Pa. The hose is of copper-clad steel, fully interlocked and asbestos packed. It is intended primarily for petroleum and chemical industry use in the handling of flammable liquids.

FOR HIGH PRODUCTION

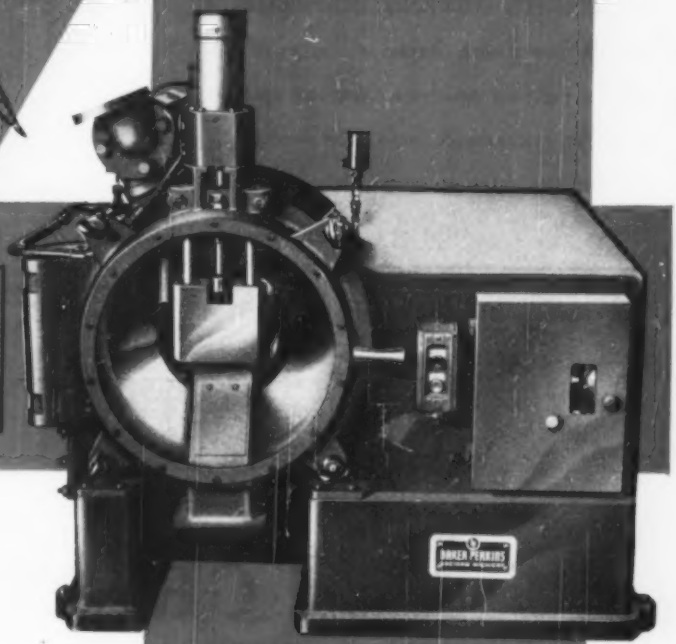
of filterable slurries . . . four sizes of the new

BAKER PERKINS type H ter Meer Centrifugals

● Now available for production — as well as the laboratory — are four sizes of the new Type H ter Meer Centrifugal for high production of filterable materials. Continuous and completely automatic, these centrifugals may be operated on cycles of from 30 seconds to 30 minutes, depending on the nature of the product being centrifuged. Free draining crystalline material frequently can be handled at a rate from 5 to 700 cu. ft. of solids per hour.

● An important feature of these continuous ter Meer Centrifugals is the wide range of retention time, making them adaptable to many types of materials from free draining crystalline to finest filterable solids. Totally enclosed, vapor-tight construction is available to prevent escape of solvents. Standard models are constructed of stainless steel, special models made of suitable metal to meet particular requirements. Write for complete information.

Size Centrifugal	Capacities cu. ft. per hour	Horsepower required	Net Weight
H-18	5-40	3	2,000 lbs.
H-24	25-100	7½	4,500 lbs.
H-36	75-300	15	7,000 lbs.
H-54	200-700	30	15,000 lbs.

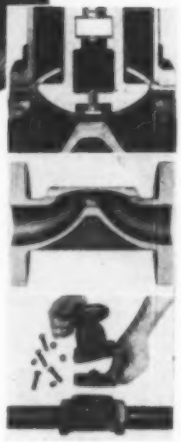


BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION, SAGINAW, MICHIGAN

Simple as pinching a rubber tube

A GRINNELL-SAUNDERS DIAPHRAGM VALVE works on a simple principle . . . it pinches tight for positive closure and opens wide for streamlined flow. The working parts of the valve are completely isolated from the fluid . . . no corrosion, no contamination and no leaks. Choice of diaphragm material. Body materials . . . cast iron, malleable iron, bronze, aluminum, stainless steel. Body linings . . . glass, lead, rubber or synthetics.



NO METAL-TO-METAL SEAT . . . The large contact area on which this flexible diaphragm seats gives positive closure even when grit, scale or other solid matter is temporarily trapped.

MINIMUM RESISTANCE TO FLOW . . . Smooth streamlined fluid passage without pockets prevents accumulation of sludge and reduces friction resistance to a minimum.

MAINTENANCE REDUCED . . . The diaphragm is the only part that normally wears out. Replaced in a few minutes without removing valve from line.

Available in various combinations of valve bodies and operating mechanisms. Write for Catalog 2-S.

99 YEARS PIPING

GRINNELL

Grinnell Company, Inc., Providence 1, Rhode Island. Branches: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Reader Service Page for . . .

NEW Chemical Engineering TOOLS

PRODUCTS AND MATERIALS • PROCESS EQUIPMENT • MANUFACTURERS' LITERATURE

Use these handy Reader Service cards for more information on this month's new products and equipment or for copies of latest trade literature.

PROCESS EQUIPMENT NEWS

See pages 139-152

Self-Priming Pump 139
Immersion Heater 139
Expendable Compressor 139
Small Steam Trap 140
Leak-Proof Valve Stem 140
Metallic Filter Medium 140
Mounted Speed Reducer 140
Non-Freezing Gage 141
Automatic Meter 142
Extreme Temperature Pump 142
Pneumatic Controller 142
Propeller Fan 142
Jet Pump 142
Motor Reducer 144
Stroboscopic Flowmeter 144
Density Recorder 144
Dual Function Controller 146
Slurry Pump 148
Bin Aerator 148
Corrosive Fluid Valve 150
Five-Gallon Filler 150
Non-Sparking Blind Flanges 152
SR-4 Resistance Wire 152
Hot Water Generator 152
All-Metal Flexible Hose 152

PRODUCTS & MATERIALS

See pages 159-172

Nylon Flannel 159
Thiosemicarbazide 159
Organosilicon Chemicals 159
Methyl Laurate 159
Silver Welding Alloy 160
Ultrasensitive Pierce Reagent 162
Dihydrostreptomycin 164
Terpene Alcohol 166
Dihydrostreptomycin 168
Non-Ionic Detergent 168
Styrenated Linseed Oil 170
Polyacrylic-Wax Copolymers 170
Chlorinated Hydrocarbon 172

MANUFACTURERS' PUBLICATIONS

See also pages 206-212

181. Wire Rope. Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp., New York, N. Y.—This 180-page bound reference collection (the 101st anniversary of the firm). The catalog not only lists the various types of wire rope manufactured or

OVER

Reader Service
CHEMICAL ENGINEERING
330 WEST 42nd STREET
NEW YORK, 18, N. Y.

Place Stamp Here

Reader Service
CHEMICAL ENGINEERING
330 WEST 42nd STREET
NEW YORK, 18, N. Y.

Place Stamp Here

Reader Service
CHEMICAL ENGINEERING
330 WEST 42nd STREET
NEW YORK, 18, N. Y.

Place Stamp Here

tion necessary, but also gives details of many of the applications for wire rope. Methods of maintenance and the general care and handling are also presented. Rope construction is included.

105. Valves. Corrosion. International Nickel Co., New York, N. Y.—This new 48-page booklet discusses salt as a corrosive problem. Part of the book discusses the corrosion problems faced by the salt refining industry itself, but the remainder of the book discusses corrosion problems encountered in handling brine solutions in the chemical and process industries. Corrosion rates are given for various metals in brine liquors and brine sprays. The booklet should be of particular interest to those persons of the process industry where salt water must be used for cooling purposes.

106. Flooring. Flintkote Co., Philadelphia, Pa.—4-page brochure describes the concrete floor resurfacing material produced by this company. Methods of application of the material are illustrated.

107. Valves. American Car & Foundry Co., New York, N. Y.—12-page catalog No. 4 illustrates the various types of lubricated plug valves produced by this company. Included are emulsified valves, multi-way valves, round-port opening valves, V-port and diamond-port valves, and steam-jacketed bear vary valves. Complete dimensions and specifications for these valves are included. Bronze and aluminum valves are discussed as well as valve wrenches.

108. Electromagnets. Magnetic Engineering & Manufacturing Co., Clifton, N. J.—6-page catalog No. 48 describes and illustrates the line of power electric lifting magnets produced by this company. Lifting capacities and dimensions are given for the standard size units.

109. Emulsion. Mace Co., Denver, Colo.—This 16-page general catalog gives information on the company's line of sintering emulsion and rock drilling equipment for use in the reduction of refractory ores, concentrates, and secondary metals. The small unit smelters produced by this company are also described.

110. Safety Valves. Farris Engineering Corp., Palmerton, Penn.—12-page catalog No. 48 gives the specifications, dimensions and list prices for all the various types of safety valves produced by this company. Included are regular safety valves, general release valves, safety release valves and corrosion-resistant valves. A large section of the catalog is devoted to engineering data for determining the proper size valve to use for a given application.

111. Adhesives. B. F. Goodrich Co., Akron, Ohio—6-page revised catalog section 1149 describes the various types of rubber base cement put out by this company. Both vulcanizing and non-vulcanizing types are included together with adhesives for bonding metal and synthetic rubber products. Standard size containers are given.

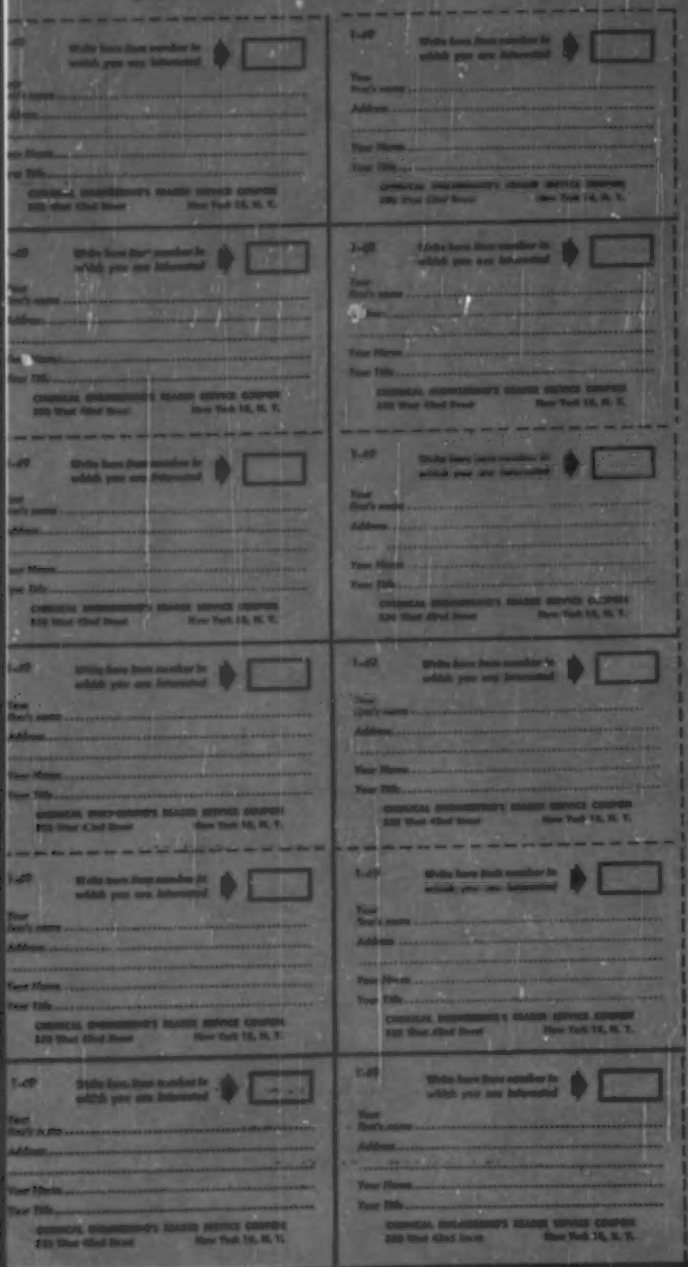
112. Materials Handling. Barrett-Cravens Co., Chicago, Ill.—16-page catalog 487 is a new edition of this company's catalog illustrating the various types of materials handling equipment produced by this company. Included are hand, hydraulic and electric lift trucks, platforms, skids, portable cranes, portable conveyors, and barrel trucks. Specifications of the units are given.

113. Transformers. Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—Publication No. 1B6015A describes the substation transformers for industrial service in ratings from 10 to 500 kva. produced by this company. Specifications of the standard units are shown together with dimensions and weights. Classes of transformers shown range from 1,100 to 34,500 volts.

114. Instruments. Penn Industrial Instrument Corp., Philadelphia, Pa.—12-page catalog No. 300 describes and

(Continued on page 206)

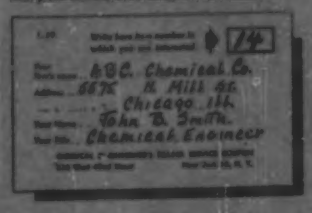
These are good for items in this issue only and must be returned by March 31, 1949



How to Use These READER SERVICE COUPONS

1. Be sure to fill out completely a separate coupon for each new product or equipment item on which you want more information and for each piece of literature you wish sent you. Reader Service will then forward them to the proper sources provided you have supplied the necessary information.

When you have filled out completely the coupons required for each request, detach the post cards, and drop in the mail.



SAVES $5000 in six months

G-E DIESEL-ELECTRIC LOCOMOTIVE SLASHES FUEL COSTS BY 89% AT TEXAS PAPER MILL

When the Southland Paper Mills put this snappy 45-ton diesel-electric locomotive into operation at the Lufkin, Texas plant about a year ago, the company did so on the strength of a modest savings estimate of $15 a day made by G-E engineers. Since then this cost-smashing locomotive has almost doubled this estimate *in just fuel savings alone.*

During six months' operation the diesel-electric saved $5000, at the rate of $27.65 per day. This is based on the $3.35 per day fuel cost for the G-E 45-tonner, compared with the daily $31.00 cost of bunker fuel oil for the replaced steam locomotive.

FIRE HAZARD ELIMINATED

In addition to savings, the G-E switcher furnished these other benefits. The absence of sparks reduced the danger of setting paper and pulp wood on fire. There's no longer any need to take time for watering. No watchman is required to maintain a head of steam.

Seven days a week, this peppy locomotive switches cars at the push of a button, often handling 15-car strings weighing over 1200 tons.

YOUR SAVINGS ESTIMATED

If you want to cut costs in your own plant, find out how many dollars one of these standard locomotives will bank for you each year. Mail the coupon for more information. No obligation of course. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

DO YOU HAVE THESE FACTS ON LOW-COST SWITCHING?

- Operating Results
- Graphs
- Tables

FREE BULLETIN

Section AP-4909
General Electric Company
Schenectady 5, N. Y.

Without obligation send me your fact-filled locomotive bulletin "Switch to Diesel-electrics and Save."

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

GENERAL ELECTRIC

A
breath-taking, bewildering
BIJOU
OF
BLISSFUL BEAUTY

WITH GRANDILOQUENT GAYETY, CSC PRESENTS A GLOWING

GEM

from its Glittering and

GARGANTUAN GALAXY!

THE CHEMICAL OF THE MONTH

TRIBUTYL BORATE

PROPERTIES:

Molecular weight	230.16 (calc.)
Density at 25°C	0.8535 g/ml (7.12 lb/gal)
Coefficient of cubical expansion (20°C-30°C)	0.00067 per 1°F 0.00103 per 1°C
Refractive index (n_D at 25°C)	1.4071
Boiling point (760 mm of Mercury)	232.4°C
Latent heat of vaporization (calc.)	13,400 g cal/mole (approx.)
Melting point	<−70°C
Viscosity at 25°C	1.601 centipoises
Surface tension at 25°C	25.8 dynes/cm
Flash point (Tag. open cup)	185°F
Solubility	Hydrolyzes rapidly in presence of water. Miscible with common organic liquids such as aliphatic alcohols, esters, diacetone, chloroform, carbon tetrachloride, and naphtha.

Specifications:

Purity: 98-100% ester by weight
Specific gravity at 25°C/25°C: 0.8550-0.8570
Distillation range at 40 mm of Mercury: 85% shall distill between 135°C and 140°C
Water: No turbidity when 1 volume is mixed with 19 volumes of 60° Bé gasoline at 20°C
Color: Water-white

USES

Convenient agent for impregnating with crystalline boric acid!
To render textiles fire-resistant!
To prevent plastic sheets and fibers from sticking together!
Improves adhesion of lacquers and inks to metal surfaces!
Inhibits formation of wax crystals in oil at low temperatures!
As gas welding flux leaves smoother, cleaner surface!
Drying agent to remove water from non-aqueous systems!

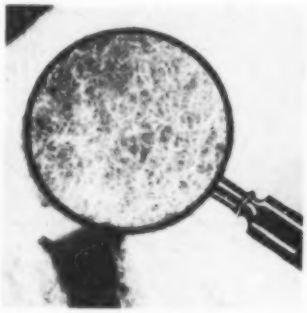
COMMERCIAL SOLVENTS CORPORATION
17 E. 42nd St., N. Y. 17

CSC

For detailed information and sample quantities, write or phone.

NEW PRODUCTS AND MATERIALS

Joseph A. O'Connor, ASSISTANT EDITOR



51. Nylon Flannel

ADVANCEMENTS in technique of production and the steady increase in industrial interest in Flalon, the 100 percent nylon flannel, have made possible a reduction in price of 40 percent. This price cut has been announced by Burgess-Berliner Associates of St. Charles, Ill., a group organized for the industrial development and sale of this unusual product. Flalon is now competitive with flannels made from other fibers and is far superior to these for many applications. Under carefully supervised laundry tests it has been found to last 6 to 12 times longer than cotton flannels on shirt presses, yet it now costs only 3.5 times more than cotton. It will last about a year on a dry-cleaning press and will add considerably to the life of sponge rubber dry-cleaning pads.

A soft, glistening white, resilient cloth with unequaled heat and wear resistance, Flalon is constructed entirely of nylon fibers, cut in short lengths (staple), crimped and heat-set. A special, very heavy (15 denier), virgin nylon fiber is used which contributes resilience and long life under severe conditions of heat and wear. This heavy, resilient, crimped nylon fiber is used in no other flannel.

Flalon is intended for such industrial uses as covers and padding for laundry and dry-cleaning presses, industrial filters and dust collectors, heating pads, carrying felts and similar items. It has all the recognized advantages of nylon; such as, freedom from rot, mildew and insect attack, very low water absorption, high strength, flame resistance and quick drying. To these the construction and special fibers used in Flalon add high resilience, high tensile strength, long wear, abrasion resistance, freedom from curling, shrinkage or stretching, and economy in use.

Flalon is available at this time in 24-, 54- and 72-in. widths, and the weight of the flannel is 14 oz. per sq. yd.

52. Thiosemicarbazide

COMMERCIAL availability of thiosemicarbazide has been announced by the National Biochemical Co. of Chicago. National Biochemical now has this chemical in pilot-plant production. Thiosemicarbazide is offered either as the free base or the hydrochloride. The free base is available in pure and technical grades, and the hydrochloride is available in the pure grade. Further information on this compound can be secured from National Biochemical Co.

53. Organosilicon Chemicals

ITS ENTRY into the field of organosilicon chemicals has just been announced by the Linde Air Products Co. Linde is currently offering four organosilicon compounds of the alkyltrichlorosilane and the alkyltriethoxysilane types in pilot-plant quantities. As production facilities expand, Linde expects to make available other organosilicons in addition to the ones now offered. It is believed that these materials will find many uses both in direct application and as "building blocks" in the production of intermediates, polymers and copolymers.

Ethyl- and amyltrichlorosilane, and ethyl- and amyltriethoxysilane are currently available in quantities suitable for investigational and process-testing studies in the organosilicon field. These four Linde silanes are colorless liquids, with molecular weights ranging from 163 to 234. They are soluble in most organic solvents.

While these silane chemicals are presently available only in pilot-plant quantities, the operation of larger units now under construction will result in the availability of greater quantities. It is anticipated that, as the demand for greater quantities of these organosilicons develops, they should be made available at prices within the range of organic intermediates. Ethyltrichlorosilane and amyltrichlorosilane are available in 1-, 4- and 9-lb. glass containers; ethyltriethoxysilane and amyltriethoxysilane are available in 1-, 3- and 7-lb. glass containers. Larger quantities of these chemicals can be obtained on advance notice.

54. Methyl Laurate

MORE than two years of experimental work were culminated when the El Dorado Oil Works, with headquarters at San Francisco, recently began at its Oakland, Calif., plant commercial production of methyl laurate. El Dorado is the only known commercial producer of methyl laurate in the U. S. Although El Dorado also makes lauric acid, it is pushing the use of methyl laurate to replace the acid as a

CONTENTS

Nylon Flannel	159
Thiosemicarbazide	159
Organosilicon Chemicals	159
Methyl Laurate	159
Silver Welding Alloy	160
Ultrasensitive Photo Emulsion	162
Dihydrostreptomycin	164
Terpene Alcohol	166
Dihydrostreptomycin	168
Non-Ionic Detergent	168
Styrenated Linseed Oil	170
Polymer-in-Wax Concentrates	170
Chlorinated Hydrocarbon	172

FOR MORE INFORMATION
See Reader Service
Coupon on pages 155-156

MATERIAL HANDLING News

When a thorough study of their materials handling and shipping methods revealed many opportunities for substantial savings, The Coleman Company, Inc., appliance manufacturers of Wichita, Kansas, installed a completely mechanized handling system planned around the Clark PUL-PAC.

The survey disclosed a conspicuous need for an efficient method of moving Coleman appliances—lanterns, camp stoves and other small items—from production to "live" storage, 1200 feet distant; for storing them in critically limited space and moving them thence to rail cars and motor trucks for shipment. Under the old system, this required as many as five individual handlings. Under the new method, the various items as they come from packaging

Clark Pul-Pac tiers a load of 98 lanterns at the Coleman Company, Inc., Wichita, Kansas.

machines are assembled in unit loads on trailers, utilizing 44" x 48" fiber sheets as load bases. Industrial tractors haul the trailers to the shipping department where the Clark PUL-PAC removes the unit loads from the trailers and tiers them in temporary storage. Finally, the PUL-PAC transfers the loads to the shipping department for order assembly.

Immediate benefits achieved through the new method were elimination of three to five handlings with comparably less damage to merchandise; a new and "highly satisfactory" shipping system; multiplication of available storage space through use of "air rights."

There may be similar undiscovered opportunities for important savings in your plant. It costs nothing to discover them if you Consult Clark.

Eliminated
3 to 5
INDIVIDUAL
HANDLINGS

Reduced
HANDLING
COSTS

Cut
DAMAGE
LOSSES

Saved
STORAGE
SPACE

APPLIANCE MANUFACTURER ACHIEVED ALL THESE BENEFITS BY INSTALLING THE CLARK

PUL-PAC

Clark Pul-Pac unloading trailer for warehouse storage.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 6, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

chemical intermediate. Other uses for methyl laurate will come in leather manufacturing and in paint removers, wax compounds and penetrants.

A typical analysis of El Dorado's methyl laurate gives an acid number of 0.5, a saponification number of 260 and an iodine number less than 1. Its freezing point is 4.4 deg. C. Analyzing 96.7 percent methyl laurate, it contains 2.4 percent methyl myristate and 0.9 percent methyl caprate.

Methyl laurate has excellent penetrating characteristics. It can be incorporated in lubricants or rust-removing compounds where this quality is required. As a modifier and softener for waxes, methyl laurate is compatible with the common waxes for polishes, waxed paper and carbon paper. In paint removers, methyl laurate retards evaporation. Moreover, it is a slow-acting paint remover itself, and its use results in an effective product that leaves a minimum residue. By incorporating a wetting agent similar to polyethylene glycol 400 monolaurate, removal of the residue with steam is facilitated. For fat liquoring of quality leathers that require high pliability methyl laurate blended with polyethylene glycol monolaurate can replace sulphated oils.

But the big possibility for methyl laurate is as a chemical intermediate. It is a source of the laurate radical where this is required for ester type surface active agents, plasticizers and lubricating compounds. Methyl laurate reacts readily with glycerine or the glycols using either an acid or alkaline catalyst. As methanol is evolved, however, a methanol recovery system is necessary. Methyl laurate can also be hydrogenated to the corresponding alcohol.

Methyl laurate has many advantages over lauric acid as a chemical intermediate. It is water-white; lauric, when dissolved, has a slight color. High in purity, it is free of iron, which is almost always present in lauric acid. Whereas lauric contains some water of crystallization, methyl laurate is anhydrous. Since it is a liquid, it can be handled easily; lauric, a solid, has to be dissolved. And, as it is non-corrosive, methyl laurate can be stored and handled in iron containers. Corrosive lauric acid requires stainless steel containers.

El Dorado ships methyl laurate in 1- and 5-gal. cans, in 55-gal. drums and in 8,000-gal. tank cars.

55. Silver Welding Alloy

A NEW high-silver alloy specially developed to supplant regular silver brazing alloys through better performance and lower cost is now available to the

FOR 1949

PUT THE PLUS IN YOUR PROCESS!*

by Standardizing on

HEYDEN CHEMICALS

FOR

PROCESS INDUSTRIES

PHARMACEUTICALS · TEXTILES

PROTECTIVE COATINGS

RUBBER · PLASTICS

FOOD PRODUCTS · RESEARCH

***THE PLUS IN YOUR PROCESS**

- . . . Constant source of supply.
- . . . Production control through uniformity.
- . . . Exacting specifications . . . assured quality.
- . . . Extensive facilities of 5 modern plants.

Serving Industry through Finer Chemicals

HEYDEN CHEMICAL CORPORATION

393 SEVENTH AVENUE, NEW YORK 1, N. Y.

CHICAGO 6: 20 North Wacker Drive · PHILADELPHIA 3: 1700 Walnut Street

SAN FRANCISCO 11: 420 Market Street

© 1949, Heyden Chemical Corporation

FINE HEYDEN CHEMICALS

Benzaldehyde · Benzoates · Benzoic Acid · Benzyl Chloride · Bromides · Chlorinated Aromatics · Chlorobenzenes · Cresylates · Formates
Formaldehyde · Formic Acid · Glycerophosphates · Guaiacols · Hexamethylenetetramine · M. D. A. (Methylene Disalicylic Acid)
Paraformaldehyde · Parahydroxybenzoates · Penicillin · Pentaerythritols · Salicylates · Salicylic Acid · Streptomycin

I'm "Crimpy"
THE BUFFALO WIRE CLOTH MAN!
My wardrobe is the most complete you've ever seen. I'm ready for any occasion, to withstand everything from ordinary wear to rust, corrosion and excessive heat.
TODAY I'M GALVANIZED AFTER WOVEN

COATED? EVERY BIT OF ME!
Know why? I'm hot dipt. But first I'm cleaned. Then, mind you, I'm pickled. Just try and work my coating loose!

AM I SMOOTH? AM I BRIGHT?
I'll say I am! I've just the right amount of zinc. Not too much. That would cause "points". Not too little. That would cause "pitting". Brother, I'm Controlled.

TAKE A LOOK AT MY NODES!
Ever see anything like them? Course not! They're sealed closed. Why, my joints are so smooth that one week I'm a tobacco apron and the next I'm a rayon conveyor.

LIKE MY SHAPE?
True and flat, isn't it? Stays that way, too! You don't see me buckling when I'm rolled out. Cut me into small pieces if you like. I'll still be square and rigid.

DON'T TAKE MY WORD FOR ALL THIS — Write my manufacturer for FREE FOLDER 597.

A valuable piece of literature about the unusual strength, firmness and wearing qualities; smooth surface, faster screening and accurate mesh of "Buffalo" Galv. After Woven Wire Cloth.

Buffalo WIRE WORKS CO., INC.
Manufacturers of All Kinds of Wire Cloth Since 1901

492 TERRACE BUFFALO 2, N. Y.

FOR MORE INFORMATION
See Reader Service Coupon on pages 155-156

welding industry. Eutectic Welding Alloys Corp. of New York announces the availability of its new Eutecrod 1700 for stainless steel, copper, brass, bronze, tungsten carbide and steel.

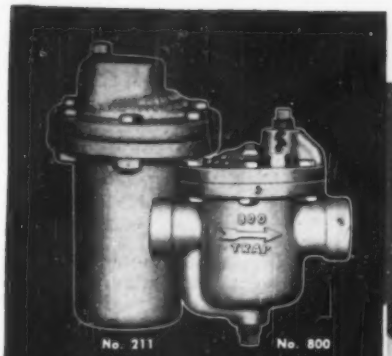
Eutecrod 1700 is an unusually thin-flowing, high-silver alloy designed to replace the regular high-cost silver solders, particularly in large-scale production runs. It gives a much better color match to stainless steel, and it is recommended for making lap, square, butt and tee joints and for sealing and filling small cracks and defects. The new silver alloy gives excellent results in joining tungsten carbide tips to steel shanks and in welding light-gage metal, as well as in joining stainless steel and in welding steel to steel or to other metals.

Eutecrod 1700 bonds at 1,020-1,250 deg. F. and has a tensile strength of 64,000-68,000 psi. It is available in $\frac{1}{32}$-, $\frac{1}{16}$-, $\frac{3}{32}$-, $\frac{1}{8}$- and $\frac{5}{32}$-in. diameters. Eutector Flux 1700 is a new high-performance flux for use with Eutecrod 1700 to insure lowest heats of application.

56. Ultrasensitive Photo Emulsion

A NEW photographic emulsion for tracking down atomic particles is so sensitive that its producers are faced with the problem of how to prevent premature exposure by cosmic rays during shipment to research workers. The new emulsion, developed in the research laboratories of the Eastman Kodak Co. of Rochester, is about four times as "fast" as the company's existing nuclear track plates. It has successfully recorded electron tracks which are ten times longer than those previously captured photographically.

Protection of the new material poses a problem for Kodak scientists. No sooner is the new emulsion made than it begins to record the bombardment of cosmic rays which rain down constantly from outer space. About six electrons from cosmic rays strike each square centimeter of the emulsion every minute. This intense barrage peppers the emulsion so much in three days time that, unless adequately protected, it is clouded with background streaks upon development. Packing the emulsion in dry ice for shipment



No. 211 No. 800

Above left — Armstrong bottom inlet—top outlet series trap.

Above right — Armstrong No. 800 side inlet—side outlet trap.

PROOF THAT ARMSTRONG TRAPS PAY DIVIDENDS:

50% INCREASE IN PLATING TANK COIL HEATING TIME after installing Armstrong traps on each tank.—Frost Electric Co., Philadelphia, Pa.

•

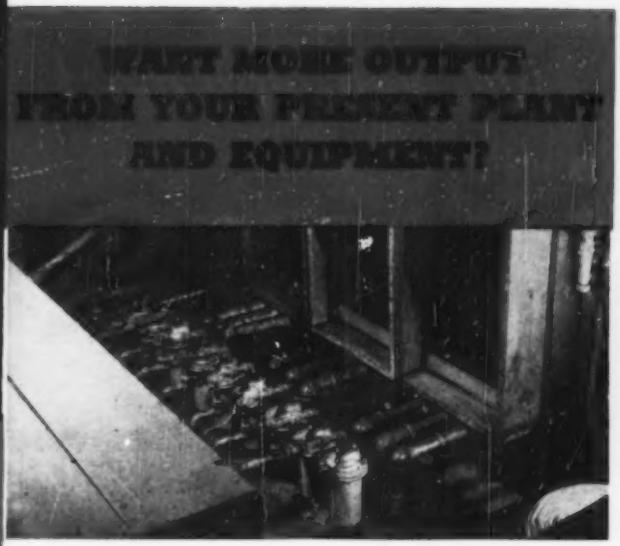
PREHAB HOUSE OUTPUT SPEEDED UP by unit trapping with Armstrong . . . heating time reduced over 50% . . . temperatures 10° higher. — Riverdale Millwork Co., Chicago, Ill.

•

PRODUCTION UP 20% as a result of $500 investment in Armstrong traps.—*Small vegetable oil refinery in Venezuela.*

•

125 HP BOILER NOT NEEDED—30 HP boiler does the job since Armstrong traps were installed. Fuel savings amounted to 800 gallons of oil per week, despite increased production. *Midland Chemical Laboratories, Dubuque, Iowa.*



Armstrong Unit Trapping is the Answer!

An individual Armstrong Steam Trap on every steam heated kettle, coil, press, unit heater, retort, dryer, etc.—that's the master key that unlocks the full output that was built into your equipment.

When more than one unit is drained by a single trap, unequal condensing rates and resultant unequal pressures permit blocking off of air and condensate in one or more units. Individual trapping prevents this, keeps all machines HOT all the time.

Armstrong Traps are the logical choice for unit trapping installations. They are small, compact traps with big capacity. They discharge air along with condensate, an essential to maximum temperatures. They seldom require maintenance—not stopped by ordinary dirt and scale—won't leak steam—the interior mechanism is made of materials suitable for 1000 pounds pressure, 900° F temperature.

For more details, write for the ARMSTRONG STEAM TRAP BOOK and the name of your nearby Armstrong Representative.

ARMSTRONG MACHINE WORKS
858 Maple Street • Three Rivers, Michigan

ARMSTRONG *Inverted Bucket* STEAM TRAPS

Check which of these will help you most

- Higher Production
- Better Quality
- Lower Costs
- Dustless Operation

Manufacturers, both large and small, in your own field have achieved not merely one or two but all of these objectives through application of

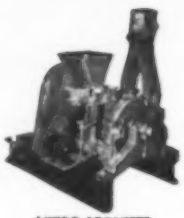
THE MIKRO PLAN FOR PROCESSING EFFICIENCY

The Mikro-Plan is not a theoretical treatise. It is a working system based on the data from 55,000 Laboratory tests made over the past 25 years . . . reinforced by performance records from installations of MIKRO-PULVERIZERS, MIKRO-ATOMIZERS and the new MIKRO-COLLECTORS.*

If you have a pulverizing or dust control problem let our engineers study it for you. They will tell you frankly whether or not our equipment, integrated in the Mikro-Plan is for you.

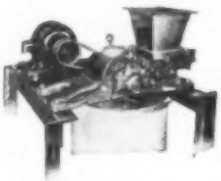
It will cost you nothing to investigate the merits of the Mikro-Plan. Just write today for your copy of our Confidential Test Grinding or Dust Collecting Data Sheets.

* T. M. Patent Applied for by H. J. Worsey, Jr. and Pulverizing Machinery Company



MIKRO-ATOMIZER
for ultra-fine grinds

MIKRO-COLLECTOR*
for optimum dust recovery



MIKRO-PULVERIZER
for granular or fine grinds

1705

PULVERIZING MACHINERY COMPANY
55 CHATHAM ROAD • SUMMIT, NEW JERSEY

MIKRO-PULVERIZER (FINE)
-ATOMIZER (ULTRA FINE)
Reg. U. S. Pat. Off.
Also Makers of the MIKRO-COLLECTOR

may protect it, because the emulsion's sensitivity is reduced at low temperatures. On arrival, it could be refrigerated and later permitted to warm up just before exposure.

The new emulsion comes very close to complete recording of any nuclear particle. It is characterized by a uniform sensitivity of all its tightly packed grains and a high concentration of silver halides. When a high-energy particle passes through a nuclear emulsion the rate of energy loss is reflected in the number of grains along the track. Thus the new emulsion will be an important photographic tool in nuclear research. From the length and curvature of the track and the grain-spacing along it, information is obtained about the particle's speed, energy and other characteristics.

The emulsion can also bring new precision to autoradiography in medical research. In autoradiography, sections of tissue containing radioactive isotopes are placed in contact with the emulsion. The specimen takes its own picture when radiation from its tissue exposes the emulsion. Examination of the developed plate enables scientists to identify the location and amount of radioactive penetration in the tissue.

So far this ultrasensitive photo emulsion, which Kodak has developed, has been made only on an experimental basis. It is not yet generally available.

57. Dihydrostreptomycin

For use in treatment of tuberculosis, a new streptomycin derivative has been developed by Merck & Co., Inc., of Rahway, N. J. The new drug, dihydrostreptomycin, causes much less dizziness and disturbance in equilibrium than does streptomycin when it is administered over long periods.

Early clinical trials of the new drug have been reported by clinicians participating in the Sixth Veterans Administration Conference on Streptomycin in Tuberculosis at St. Paul, Minn. These reports and other clinical tests, together with earlier highly encouraging reports from the Merck Institute for Therapeutic Research, have resulted in the company's decision to produce dihydrostreptomycin.

Production of streptomycin as the calcium chloride complex, a purified form which went far in eliminating many undesirable side effects associated with the earlier products, failed to solve the problem of neurotoxicity. Dihydrostreptomycin, the new derivative, which is less toxic in this respect, is regarded as one of the most significant developments since the discovery of streptomycin.

The new product is in pilot-plant production, and manufacturing facili-

WHAT'S YOUR SEPARATION PROBLEM

"I am De Laval Centrifugal Force. I have helped many Process Engineers speed up separation or clarification by doing the job continuously. I force less efficient, slower methods of separating or clarifying liquids into the discard.

I'VE GOT THE ANSWER IN TERMS OF ECONOMY

DE LAVAL "NOZZLE-MATIC" SEPARATOR
Model AC-VO
For continuous separation of two liquids and simultaneous continuous removal of solids from the liquid mixture.

SPEED AND A BETTER PRODUCT!

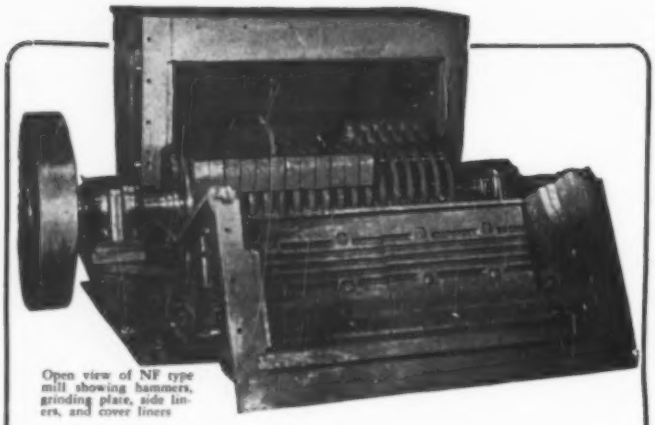
"I am an economical force, too — I operate wholly mechanically and require no replacement of parts as I do my work. Therefore, I am just as efficient at the end of a long run as at the beginning.

"De Laval supplies many different types and sizes of machines to enable me to be used to best advantage. Some are small laboratory models . . . some, large 'Nozzle-Matic' machines with capacities up to 6,000 gallons per hour or even more, depending on the nature of the liquids being separated.

"For more information about how De Laval Centrifugal Force can help *you*, write me at this address."

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval **CENTRIFUGAL MACHINES** ***For Processing Systems***



Open view of NF type mill showing hammers, grinding plate, side liners, and cover liners

HEAVY DUTY HAMMER MILLS

for All Industrial Grinding Jobs

Williams is the world's largest organization of crushing, grinding and shredding specialists and have developed standard machines for the reduction of practically every material whether animal, mineral or vegetable.

Capacities range from 50 pounds to 300 tons per hour permitting selection of exactly the proper size for your work. Whether you wish to grind chemicals to 400 mesh, crush 4 feet cubes of rock or shred steel turnings, you can profit by Williams' experience.

— We solicit your inquiries —

●

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO.

2706 North Ninth St. St. Louis 6, Mo.

Sales Agencies Include

CHICAGO 5
37 W. Van Buren St.

NEW YORK
115 Broadway

PHILADELPHIA 6
15th & Market Sts.

●

Williams

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

PATENT CRUSHERS GRINDERS SHREDDERS

FOR MORE INFORMATION
See Reader Service
Coupon on pages 155-156

ties are being readied at the Stonewall plant in Elkton, Va. Full-scale production will be started as soon as these facilities are ready. Dihydrostreptomycin will first be distributed through domestic outlets, but later, as supplies increase, it will also be made available to the export market.

58. Terpene Alcohol

In a pilot plant at Jacksonville, Fla., the Naval Stores Division of the Glidden Co. is producing an interesting new bicyclic primary alcohol by condensing beta pinene and formaldehyde. The synthetic terpene alcohol has the empirical formula $C_{11}H_{17}OH$. Nopol, as it is called, is now being offered in drum quantities.

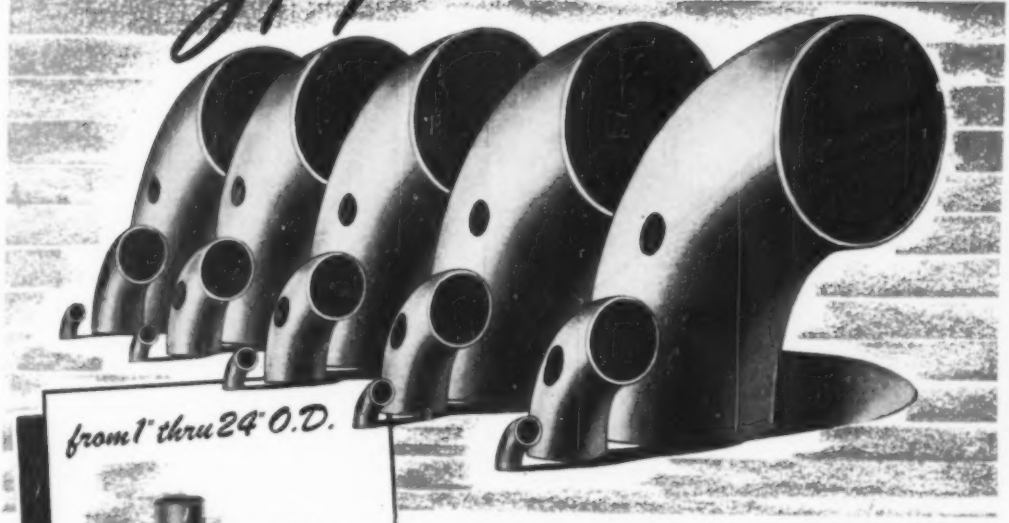
Nopol may be considered methylol pinene. As its structural formula indicates, there are present in one molecule the reactive pinene and primary hydroxyl groups. It, therefore, undergoes practically all reactions which have been applied to pinene, as well as those applicable to primary alcohols, thereby providing a path to synthesis of a host of novel and potentially useful products.

Beta pinene from which Nopol is prepared is present to the extent of 30 to 34 percent in gum turpentine in the form of its optically pure levo isomer. Nopol is also an optically pure levo compound; no loss of optical activity is experienced in its preparation. Although prepared from beta pinene, Nopol contains the alpha pinene structure, a shift of the double bond from the semicyclic position in beta pinene to the ring unsaturation of alpha pinene having taken place in Nopol formation.

Nopol is the only primary alcohol derived from the terpenes which is potentially available in large volume and at low cost. The only terpene alcohols available at present in volume are in the form of pine oil which consists of a complex mixture of the monocyclic tertiary alcohols, the terpineols, with smaller quantities of the bicyclic secondary alcohols borneol and fenchol, and hydrocarbons.

Purity of Nopol being offered ranges from 97 to 99 percent. Nopol is insoluble in water, but it is soluble in all proportions in most common or-

the Zephyrweld LINE IS COMPLETE!



from 1" thru 24" O.D.

TEES

LATERALS

CROSSES

RETURN BENDS

...as well as REDUCERS and ADAPTERS for use with practically all other fitting types

...A FULL RANGE OF STAINLESS STEEL WELDING FITTINGS FOR PERMANENT CORROSION-RESISTANT CONVEYING LINES

Tri-Clover now offers the most complete line of *"Zephyrweld"* stainless steel welding fittings in sizes from 1" through 24" O. D., fabricated in gauges from 16 to 10, for use with stainless steel light gauge O. D. tubing, in permanent installations where liquid conveying lines require positive protection against corrosion.

Employing modern, unique and proved methods throughout, the new *"Zephyrweld"* porosity-free fittings are fabricated from three standard stainless steel types... 304, 347 and 316.

"Zephyrweld" fitting ends are cut flush for rapid welding. Because of their light gauge, no chamfering is required. Fittings can be flame cut for disassembly, used again by re-welding. *For better, lower cost corrosion-resistant conveying lines, see your Jobber, or write for complete catalog.*

FLANGED TYPE *Conical End* **FITTINGS ALSO AVAILABLE**— *for faster installation and disassembly of lines... fabricated from stainless steel type 316 for use with commercial tolerance light gauge tubing having outside diameters from 1" thru 10". Easily assembled with lightweight, high strength couplings, which provide an extremely compact, flush, leak-tight union for working pressures up to 250 psi. Complete line of ells, tees, crosses, adapters, etc. Write for catalog.*

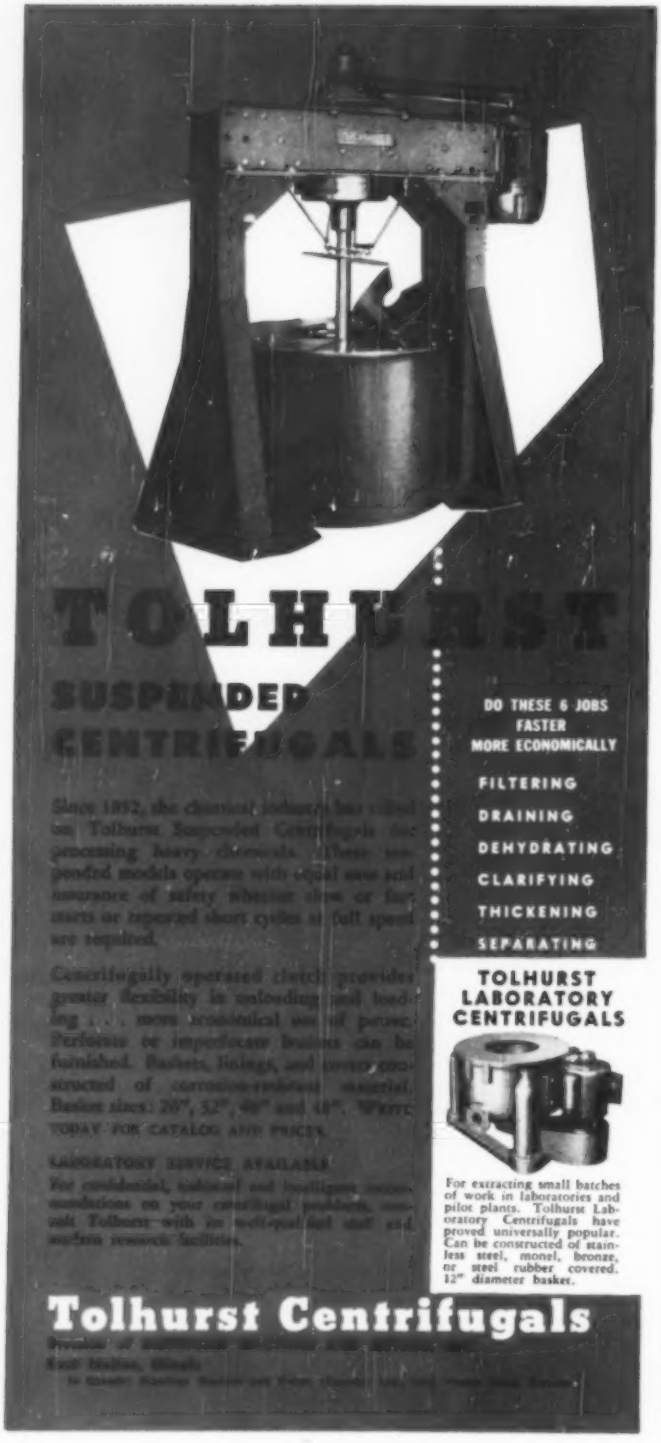
Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

Stocks now carried by distributors strategically located throughout the United States



ganic solvents. Its density is 0.963 at 25 deg. C., its index of refraction at the same temperature is 1.492, and its specific rotation −36.3. It boils at 111 deg. C. at 10 mm. and at about 235 deg. C. at atmospheric pressure.

59. Dihydrostreptomycin

Now being produced commercially by Chas. Pfizer & Co., Inc., of Brooklyn is the new antibiotic, dihydrostreptomycin. As supplied by Pfizer, the new streptomycin derivative is in the form of its sulphate salt.

Dihydrostreptomycin is chemically derived from streptomycin, and clinical experience indicates that it will be highly effective in the treatment of many infections, including tuberculosis. While dihydrostreptomycin does not wholly overcome the untoward effects associated with streptomycin, it can be administered for longer periods of time before these become evident. This makes possible longer administration of the drug, and it gives promise that some infections may be cured before any untoward effects result.

Dihydrostreptomycin sulphate, like other Pfizer antibiotics, will be available to the medical profession through a number of pharmaceutical companies. The drug will also be available for export.

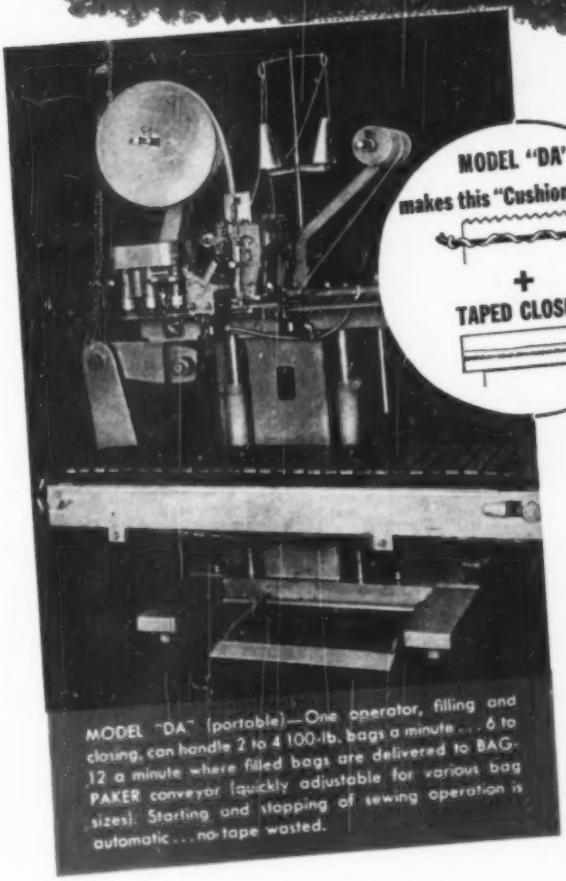
60. Non-Ionic Detergent

The new non-ionic detergent Renex is now being made available nationally by the Atlas Powder Co. of Wilmington. Previously Renex had been tested for almost two years in commercial laundries in the East. The results of this testing program have been highly successful.

Renex is a light amber liquid derived from vegetable and petroleum base materials. It is highly concentrated in detergent power, being essentially 100 percent active. It belongs to the nonionic class of materials, as distinguished from anionic and cationic products. It is neutral in pH and harmless to delicate fabrics.

Renex is designed to prevent formation of excessive suds. It remains in solution where needed to lift soil from the surface and prevent its redeposition. It does an effective cleaning job and does not form curds or scum in hard water (including sea water) or in alkalis, acid and salt solutions such as might be necessary for protection of certain fabrics or dyes in washing. Renex is chemically stable. It is miscible with water in all proportions and gives clear solutions in hard or sea water. While a temperature of about 120 deg. F. is usually optimum

protect bag contents with BAGPAK "CUSHION STITCH" CLOSURE



MODEL "DA" (portable)—One operator, filling and closing, can handle 2 to 4 100-lb. bags a minute . . . 6 to 12 a minute where filled bags are delivered to BAGPAKER conveyor (quickly adjustable for various bag sizes). Starting and stopping of sewing operation is automatic . . . no tape wasted.

HERE'S the closure that's just as tough, sift-proof and moisture-resistant as the plies of the high-grade, open-mouth BAGPAK bag itself.

Make a note to contact us today. Our engineer will gladly discuss with you your packaging machinery and multiwall paper bag requirements . . . show you the best methods of weighing, closing and handling such bags.

*Reg. U. S. Pat. Off.

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY
Bagpak Division
220 E. 42nd St., New York 17, N. Y.

***BRANCH OFFICES:** Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kans., Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, Syracuse.*
***IN CANADA:** Continental Paper Products, Ltd., Montreal, Ottawa*

Easily installed in almost any piping layout!

MORRIS TYPE "R" SLURRY PUMP has 72 different combinations of nozzle locations . . .

● The suction disc swivels on the hooded bearing frame fit. This means that you can put the suction nozzle in almost any position, including the vertically upward position. This location is particularly convenient if you intend to put the pump directly under a suction tank or chest.

● The shell of the Morris Type "R" Slurry Pump is also simply constructed with extra heavy wall thickness. Its symmetrical shape permits either right or left hand rotation. By swiveling on the suction disc, you can get eight different positions of the suction nozzle.

Other features of the Morris Type "R" Slurry Pump

EASY DISMANTLING

You can renew the impeller and shaft sleeve without disturbing the suction and discharge piping or bearings.

LONGER TROUBLE-FREE OPERATION

The Morris Type "R" does not have internal studs or bolts. The liner is firmly clamped in position, shoulder-fit between disc and shell.

ALL-TIME LOW IN STUFFING BOX MAINTENANCE

The Morris Type "R" takes its suction from the drive side only. Equally reliable under high suction pressure . . . high vacuum and high suction lift.

FOR CHEMICAL OPERATIONS

The Morris Type "R", handles mixtures containing ore concentrates . . . tailings, slag and residue from filters and classifiers . . . all types of caustic or acid mixtures containing abrasives or solids.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Branch Offices in Principal Cities

MORRIS Centrifugal Pumps

FOR MORE INFORMATION
See Reader Service Coupon on pages 155-156

for most cleaning operations. Renex is effective in cold tap water and in hot water (180 deg. F.). Renex drains rapidly and rinses readily, even in cold water. In general, because it is nonionic, Renex is considerably less irritating to the skin than ordinary ionic types of detergents.

This detergent can and does do the work of both high and low titer soaps in laundries. That is one of the chief reasons why it is now used in large commercial laundries in Philadelphia and New York. It is also used in the laundries of hotels in those cities. Renex has also found wide acceptance in scouring textiles and fibers, including cotton, during processing. The nonionic detergent can be compounded with alkalis, and with both anionic and cationic detergents.

61. Styrenated Linseed Oil

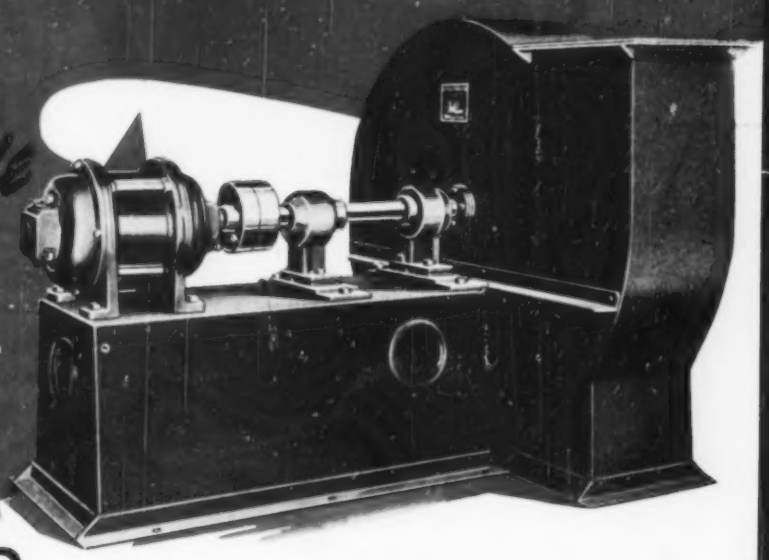
COMMERCIAL development of a new synthetic process oil for use as a protective coatings vehicle has been announced by Spencer Kellogg & Sons, Inc., of Buffalo, N. Y. The vehicle is styrenated linseed oil. Styrene, the synthetic chemical used during the war for the manufacture of rubber, has been combined successfully with soybean oil by the Kellogg research laboratories and introduced under the trade name Keltrol. This was accomplished last year. Further experiments have now resulted in the combination of styrene and linseed oil. The new oil is used to produce paints and varnishes that dry rapidly, and it can be used to seal porous surfaces without absorption. It produces a harder film than styrenated soybean oil, with high elasticity and resistance to water and alkali. Kellogg styrenated linseed oil has been trade-named Keltrol L and is already available in commercial quantities.

62. Polymer-in-Wax Concentrates

THREE new types of Arwax concentrates holding great promise for all users of paraffin and microcrystalline waxes are now being made by the American Resinous Chemicals Corp. of Peabody, Mass. The new products

Corrosive Fume Problem?

This Fan can handle it!



"Buffalo" RUBBER-LINED FANS

Last 3 to 12 Times Longer!

It's simple. Many fumes that do not easily affect rubber would quickly destroy metal housings and wheels. "Buffalo" Rubber-Lined Exhausters have high grade medium or hard rubber "welded" to all internal parts by the B. F. Goodrich "Vulcalock" process. They're lasting up to 12 times as long as all-metal fans, by actual report from their many installations in the field. It's just another example of the savings "Buffalo" specialized fans offer you. If you have a fume problem—or any other air handling problem—call in your "Buffalo" representative for facts on the fan to handle it best.

Bulletin 2424-E tells you how to move fumes at less cost. Write for your copy—check the facts against your need.

5th Edition
A "Must" For Every Engineer!

FAN ENGINEERING, 5th Edition, offers you 808 pages of latest facts on air problems, including: fans, air flow, sound laws, heat, cooling, drying, air properties, humidity, air conditioning!

ORDER YOUR COPY NOW **Price $6.00** Postpaid in U. S. A.

"Buffalo" "First For Fans"

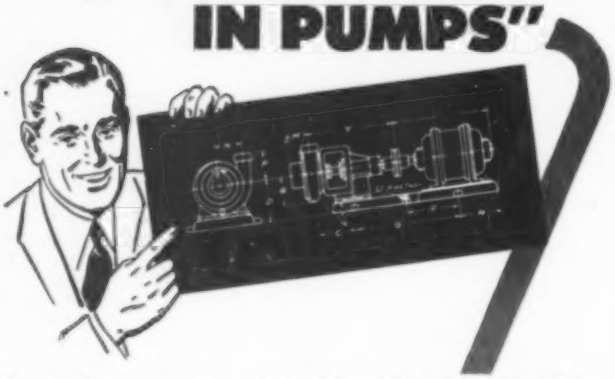
PERMANENT SATISFACTION IN AIR HANDLING

BUFFALO FORGE COMPANY

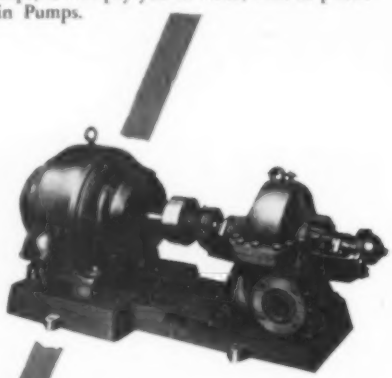
501 Broadway, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Branch Offices in all Principal Cities

VENTILATING
AIR TEMPERING
FORGED DRAFT
HEATING
AIR WASHING
INDUCED DRAFT
COOLING
EXHAUSTING
PRESSURE BLOWING

"Career Men IN PUMPS"



One product . . . pumps . . . has had the undivided attention of this company for nearly 60 years. That's why the chemical industry looks to Weinman for help on *any* pump problem. Weinman's advanced methods, creative craftsmanship and "on the job" experience assure you pumps that handle fluids most efficiently. All-Bronze, All-Iron, All-Nickel, All-Aluminum and All-Stainless Steel construction is available in most Weinman Pump modifications and sizes. Whenever you need advice about pumps, it will pay you to write, wire or phone Weinman—Career Men in Pumps.



TYPE JC TWO STAGE SPLIT CASE PUMP — These pumps are of the two stage back-to-back impeller design. The rotating element can be removed without disturbing pipe connections. Capacities up to 600 G. P. M. Heads to 600 ft.

TYPE K SINGLE STAGE UNIPUMP — Type shown has 3" discharge and 10 H. P. 1750 R. P. M. motor. Discharge nozzle may be placed in any of four positions. Available with mechanical shaft seals to prevent leakage of fluid handled.

Built by Centrifugal Specialists

The WEINMAN Pump Mfg. Co.

298 Spruce Street • Columbus 8 • Ohio

are concentrates of either polyethylene, butyl rubber or S-polymer in paraffin or microcrystalline wax. They supplement the first series of Arwaxes which were Vistanex concentrates. All of the new concentrates are stabilized against degradation by heat or oxidation. Addition of these new concentrates to the Arwax line broadens the property-improving qualities of Arwax as an addend to paraffin for many industrial applications.

The polyethylene concentrates improve the grease resistance and gloss of paraffin coatings while raising the block point. High and medium molecular weight polyethylene concentrates increase tensile strength more than do any other type of Arwax. Butyl rubber concentrates enable the wax compounder to improve tensile strength and to increase flexibility and adhesion at a lower cost than is possible with Vistanex. Another advantage of butyl concentrates, as compared with Vistanex, is lower viscosity at higher polymer concentrations. This allows greater ease of application. The S-polymer concentrates of Arwax provide dry, tough and less rubbery wax coatings than the polybutenes which are still flexible and have good resistance to MVT.

Producers of milk cartons, bread wrappers, frozen food packages, laminations and greaseproof cartons have found that these resins give interesting properties as wax addends. However, the compounding of polyethylene, butyl rubber and S-polymer requires costly heavy-duty equipment. The American Resinous Chemicals Corp. therefore offers uniform, easy-blending Arwax concentrates.

63. Chlorinated Hydrocarbon

Now being produced in pilot-plant quantities by the Hooker Electrochemical Co. of Niagara Falls is hexachlorocyclopentadiene or C-56. A highly reactive chemical, this new product should be a versatile chemical intermediate. Among classes of end products which may be prepared from C-56 are: acids, acid chlorides, acid anhydrides, esters, amides, ketones, diketones, quinones, acetals, nitriles and fluorocarbons. Probable fields for applications of this new chemical are insecticides, dyes, pharmaceuticals, resins, germicides and fungicides.

The new chlorohydrocarbon is a yellow to amber colored liquid with a pungent odor. It has a molecular weight of 272.79, a boiling point of 236 deg. C., a freezing point of −2 deg. C. and a specific gravity of 1.715 at 15.5 deg. C. It has no flash point. Additional physical and chemical information can be secured from Hooker.

Enjay will help you!

Are you looking for an oxygenated solvent or hydrocarbon to meet unusual requirements? Whatever your compounding problem, ENJAY'S technical staff is ready to help you get the most out of our products. They are also prepared to work with you in developing new uses for various ENJAY chemicals.

Supported by the nation's largest and most modern petroleum research laboratories, new ENJAY products are constantly being developed and standard products improved. One of them, listed below, may be just what you need. For information, write today.

ENJAY SOLVENTS

PETROHOL* Isopropyl Alcohol (91%, 99%)—$CH_3CHOHCH_3$
Secondary Butyl Alcohol—$CH_3CHOHCH_2CH_3$
Isopropyl Acetate—$(CH_3)_2CHCOOCH_3$
Secondary Butyl Acetate—$CH_3(C_2H_5)CHCOOCH_3$
Isopropyl Ether—$C_3H_7OC_3H_7$
Methyl Ethyl Ketone—$CH_3COC_2H_5$

ENJAY HYDROCARBONS

Butadiene—$CH_2:CHCH:CH_2$
Isobutylene—$CH_2:C(CH_3)_2$
Diisobutylene—$CH_2:C(CH_3)CH_2C(CH_3)_3$†
Triisobutylene—$CH_2:C(CH_3)CH_2C(CH_3)_2CH_2C(CH_3)_3$†

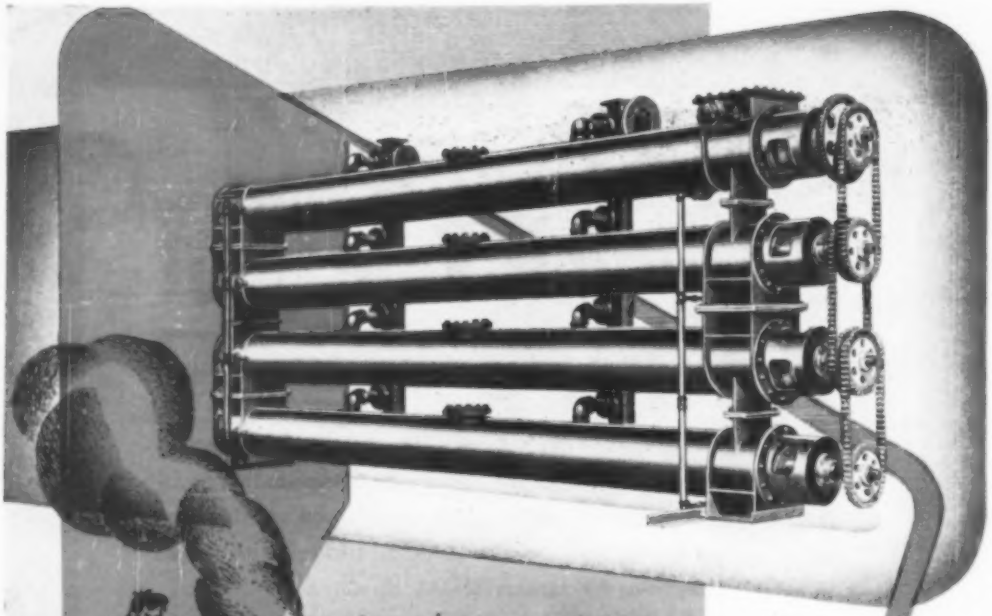
† Other isomers also present.

CTLA POLYMER—An economical heat-reactive, aromatic-type olefinic hydrocarbon. Highly unsaturated. Dries by polymerization and oxidation. Miscible in all proportions with drying oils. Compatible with most resins.

ENJAY

*Registered Trade Mark

ENJAY COMPANY, INC.
Esso Building, 15 West 51st Street
New York 19, N. Y.



The Perfect Solution to Many DRYING Problems

Acme Multi-Stage Continuous Dryers provide maximum operating economy in a wide variety of applications. Consisting of stationary, welded, jacketed cylinders, they may be fitted with internal rotary conveying and mixing type paddles, ribbons or screws. The internal parts are readily accessible for cleaning or withdrawal. They may be used for solvent extraction under vacuum, atmospheric or higher pressures and are very efficient for granular or crystalline chemicals and for organic materials such as grain, starch or meal.

The Acme Multi-Stage Continuous Dryer is just one of several highly-developed types of drying equipment, designed and field-tested by Acme for providing greater efficiency in any drying operation. Further information available on request.

COMPLETE DRYING SYSTEMS
DRUM DRYERS
SPRAY DRYERS
FLASH DRYERS
ROTARY STEAM DRYERS
ROTARY FLUE GAS DRYERS

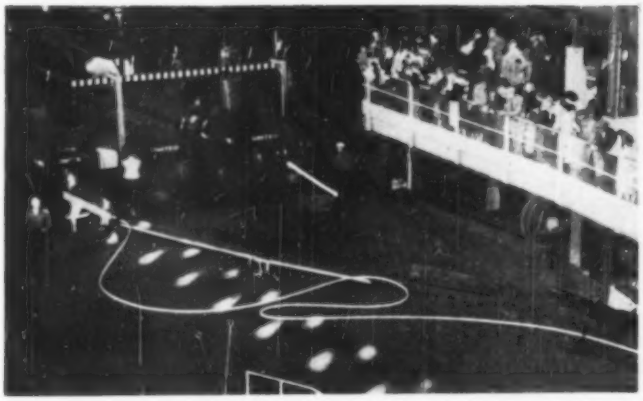
ACME *Processing Equipment*

MEN, MACHINES AND METHODS

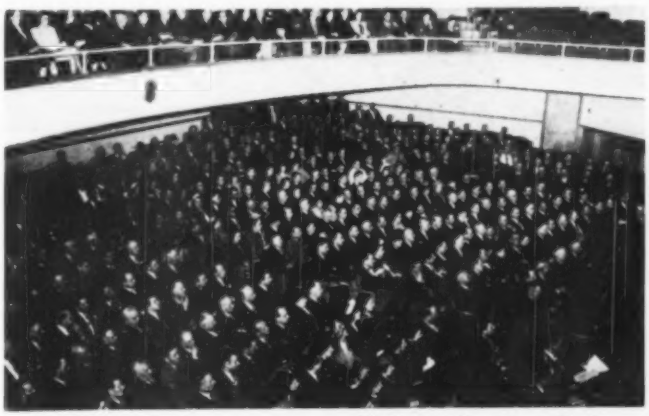
Roger Williams, Jr., ASSISTANT EDITOR

Allegheny Ludlum Writes New Chapter in

Public Relations



OPEN HOUSE was held recently at two of Allegheny Ludlum's steel mills. An excellent example of active public relations, visitors came from miles around.



OPEN MEETING is held each year at many Allegheny Ludlum plants. Employees, labor leaders, local citizens hear what the plant has meant to the community.

ONE DAY this fall the town of West Leechburg, Pa., had some strange events happen to it. The Borough Council declared a holiday. Parking meters were covered and "one hour" parking restrictions were waived. Volunteer firemen became special traffic police. Boy and Girl Scouts served as guides. All stores were closed. Three bands supplied continuous music. Women's clubs set up free "baby sitter" services. The streets were decorated. Newspapers put out special sections.

Why all this holiday spirit? Because the management of the Allegheny Ludlum Steel Corp. was celebrating the 50th anniversary of its plant at West Leechburg by having an open house. At the same time similar doings were happening at Dunkirk, N. Y. AL celebrated the 40th anniversary of its plant there.

The open house form of community relations is growing. Successful visits to plants have been held by other companies but few could have been more successful than these two.

At West Leechburg, more than 15,000 people poured through the plant during the two-day open house. The 1940 population of West Leechburg was 1,123 and of neighboring Leechburg 4,275.

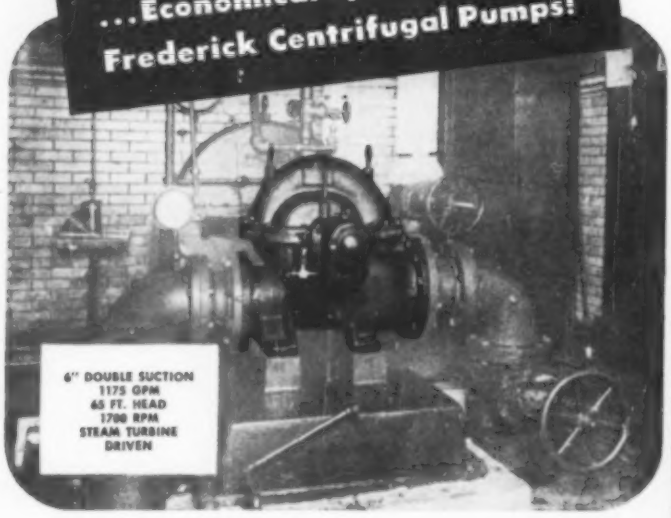
At Dunkirk more than 22,000 people saw the plant. The population of Dunkirk—17,713 in the last census.

Allegheny Ludlum tried a few new techniques for these open house celebrations. First of all they were community projects, for the entire community in which the plant operates, not just employees and their families. The net result was the community effort mentioned above. As an example, schools declared the open house a part of school work. Classes were conducted at the plant and each student then wrote a theme on the most interesting thing he saw on the tour.

Many an executive, seeing the success of such open house programs, has

GET EXTRA LONG LIFE

...Economical operation from Frederick Centrifugal Pumps!



Twenty-nine years ago, Frederick Iron & Steel manufactured its first centrifugal pump . . . a 6" Double Suction Volute type. Delivered in July, 1919, this pump is still in operation today at the Dominion Coal Co. in Sydney, Nova Scotia. Minor repair parts over the 29-year period have been furnished promptly by Frederick. Today, Frederick Iron & Steel is manufacturing a complete line of single and double suction, single and multi-stage centrifugal pumps with the same long-lasting quality built into its first unit. When you buy Frederick pumps you're assured of continuous, economical operation from extra long life.

We have among our designs just the centrifugal pump you're looking for. Drop a line to the address below and we'll gladly send you an attractive, illustrated "file-size" brochure on our pumps as well as the name of our factory representative nearest you. Ask for Bulletin 104.

Frederick
ESTABLISHED 1890
IRON AND STEEL, INC.
Department P-2 — REPRESENTATIVES IN PRINCIPAL CITIES — Frederick, Md.

ALSO MANUFACTURERS OF FRECUT AND FREFORM METALWORKING MACHINERY, FREDERICK STOKERS AND ASH CONVEYORS AND A COMPLETE LINE OF GRAY IRON CASTINGS

thought of trying similar plans in his own plant. But then he has balked for fear of lost production, possible damage to the plant, possible lawsuits. Allegheny Ludlum has answered one of those questions. Here is what they say: "A most easily measured result of the tours was production in the plants while they were in progress. Increases in output in the various departments ranged from 25 to 200 percent."

These children probably will not remember this visit to an Allegheny Ludlum plant; you can bet Mom and Dad will.

Here's how the AL plant tours were handled. In both plants, the program was divided into three parts. First, exhibits were installed at the entrance depicting the world-wide scope of the raw materials used by the plant. This was done with maps, photographs and actual samples of the various alloys used. Second, the plant tours were arranged to permit visitors to follow the progress of the metal from the time it entered the plant, through its various refining and finishing process to final shipment. In the shipping department a display showed the world-wide distribution of the products. Third, with the cooperation of about 100 companies, formal exhibits of products made from the plant's steel were on display. This last was accomplished by assigning booths to cooperating companies. These companies installed and manned their exhibits, with plant supervision for purposes of color scheme and layout.

This last trick might get over one

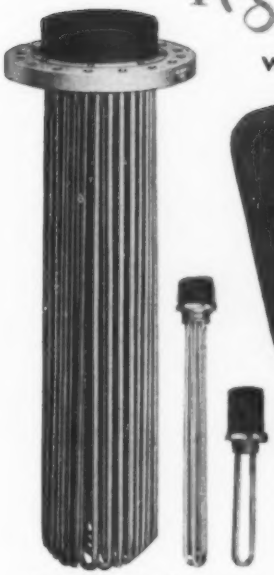
HEAT GASES AND LIQUIDS

Efficiently and Economically

"Right on the Job!"

with

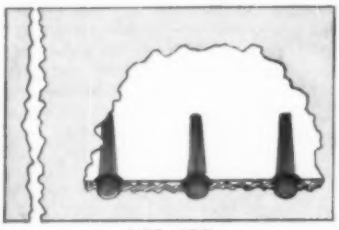
CHROMALOX



TMO Type Immersion Heaters are made in sizes up to 75 KW to operate in temperatures up to 800° F. and pressures up to 600 pounds.

CHROMALOX Tubular Immersion Heaters are used for heating compressed air and other gases: for super-heating steam; for heating liquids and Dowtherm, Prestone and similar heat-transfer mediums. They can be readily applied to high-temperature and high-pressure operations.

CHROMALOX Electric Immersion Heaters give you the *exact* temperatures you require and maintain these temperatures accurately. Dependable performance, economical operation, reduced spoilage are among other advantages gained by using these easy-to-install heaters.



GIANT STEAM ACCUMULATOR USING CHROMALOX IMMERSION HEATERS (SIMPLIFIED VIEW)

Twenty-four TMO Heaters of 24 KW each are used in this steam accumulator (approximately 72 feet long, 8 feet diameter) to maintain 300° F steam temperature.

This installation was worked out on the job by Chromalox Application Engineers who are always ready to help solve your heating problems.

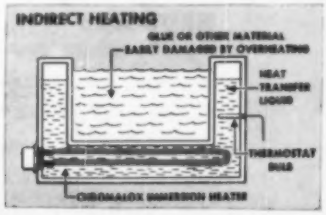
CHROMALOX

Electric Heat for Modern Industry

EDWIN L. WIEGAND CO. 7514 Thomas Boulevard · Pittsburgh 8, Pa.

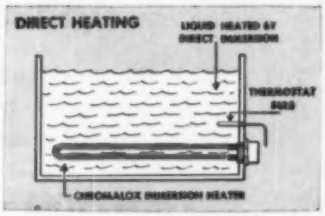
Typical Examples

of a few of the many uses for Chromalox Immersion Heaters



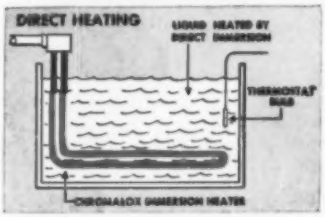
WATER OR OIL JACKETED KETTLES

Heaters are quickly and easily mounted in kettle wall; temperatures are accurately maintained manually or by automatic control. Uniform heat transfer makes this application particularly good for liquids that must be heated slowly to prevent damage by overheating.



HEATER MOUNTED PERMANENTLY IN TANK

Chromalox Immersion Heaters are welded or bolted through tank wall. Heaters are sheathed in copper, steel or alloy—as required to defeat corrosion. Temperatures are controlled thermostatically. Heat is absorbed directly and efficiently.



FOR HEAVY-DUTY IMMERSION HEATING

Low-density Immersion Heaters are especially designed for high-temperature melting-pots or salt baths. Heaters have legs to raise elements above sludge accumulation. They are quickly installed and easily removed for maintenance.

Want more Examples?

Request the fully-illustrated booklet "100 Ways to Apply Electric Heat." It contains photographs and drawings showing Chromalox Electric Heaters at work in plants throughout the United States. Write today for your copy.

IC-41

DE LAVAL VERTICAL DRIVE REDUCERS

A complete line of De Laval vertical speed reducers, in both single and double reductions, is available for driving agitators, mixers, and many other types of vertical shaft equipment.

If vertical drives are your problem, consult De Laval.

✻This single reduction De Laval Worm Gear Reducer is available with many standard gear ratios and is but one of the 93 sizes and types of standard De Laval Worm Gear Speed Reducers.

✻ ONE OF 93

WG-10

Worm Gear Division

DE LAVAL

De Laval Steam Turbine Co., Trenton 2, N. J.

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS
CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

of the problems many chemical companies face: their product stays in pipes or vessels all the time, is never seen. The problem is one of glamorizing a colorless liquid, in many cases, and it isn't easy.

Allegheny Ludlum pulled another trick out of the hat. All nearby stockholders were invited to attend and wear armbands. Some 540 of them did and here is what Al says of them: "Not only were many of them seeing the plant for the first time, but by identifying themselves as stockholders by wearing armbands, they presented an economic message to employee and visitor alike—that the American stockholder is not as he is portrayed by cartoonists."

Open-House Booklets

As the visitors came into the plant they were presented booklets highlighting the trip. The booklets are a good example of explaining highly technical material to the layman. Here's a sample, entitled "Melting Magic."

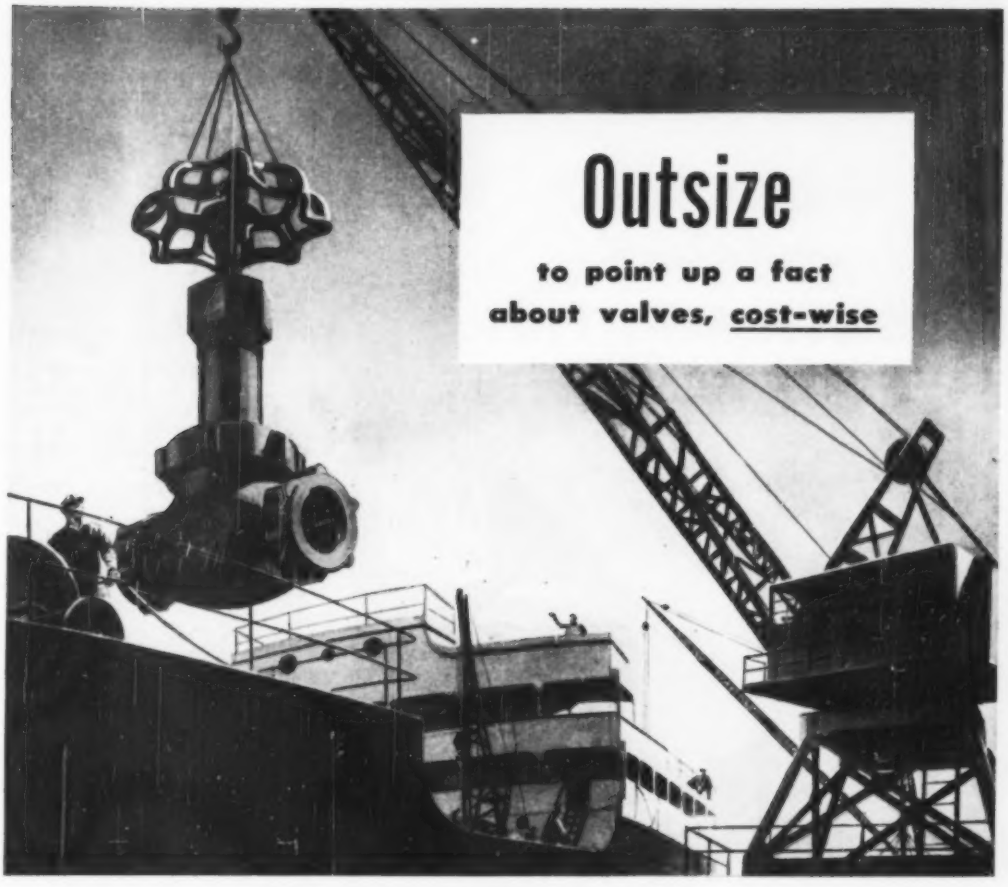
"Fine high alloy steels are born in the electric furnace. Down the line you'll see three electric melting furnaces where alloys are mixed with selected scrap—measured with the precision and skill of a pharmacist. Heat, up to 3,000 degrees Fahrenheit, is supplied by three big carbon pillars sticking out through the furnace top. Those pillars, called electrodes, are charged with as much as 400,000 watts of electricity, one-half again as much as used by Dunkirk and Fredonia combined, and when they come in contact with the metal in the furnace they cause something like a gigantic short circuit except there's no fuse to blow.

"Above other mill noises, you can hear the roar of the current as the electrodes bite into the metal, turning it into a molten bath and burning out impurities. If you're lucky, you'll see one of the furnaces tip and pour the liquid steel into a ladle. That's a sight you won't soon forget—angry metal roaring like Niagara as it streams down to hurl millions of midget meteors from the huge containers."

The West Leechburg booklet concludes, "Incidentally, we here at the West Leechburg plant recognize that we are an integral part of this community. We're proud of our plant and we hope you will be, too. If you still have some questions about our operations, write them down and mail them to me, 'Al,' in care of this plant. I guarantee you an answer."

* * *

During a recent junket to Pittsburgh we had the privilege of chatting for quite a time with H. G. Batcheller,



No SHIP was ever fitted with a valve this big. We took broad liberties with proportion in this picture because a valve's size can be misleading. In comparison with larger plant units, the cost of a single valve seems a minor, "petty cash" investment. But if, as here, *all* the valves could be viewed as *one* valve, you would see that valves actually represent a *major* expenditure.

In any plant, any building where operation involves fluid control, it pays management to keep this "collective" valve in mind. These days, especially. You pay more than ever today, in wages and material costs, for every operation in your plant—including valve maintenance.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by *thousands*, it is a serious drain on operating budgets.

JENKINS BROS. helps you meet this problem. In *two* ways. One, by building extra endurance into Jenkins Valves. They are the longest-lasting, lowest-upkeep valves that money can buy. Two, with advice from Jenkins Engineers on any question of proper selection, installation, or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering for lowest valve costs in the long run. *Sold through leading Industrial Distributors.*

Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write JENKINS BROS., 80 White St., New York 13, N. Y.

LOOK FOR THIS JENKINS DIAMOND MARK

SINCE Jenkins Bros 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need

SWITCH TO PORCELAIN
for
INSURANCE
against
CONTAMINATION

In handling liquids and semi-liquids, install ILLINOIS porcelain pipe and fittings for a permanent means of handling materials.

ILLINOIS PORCELAIN SYSTEMS FOR HANDLING LIQUIDS GIVE YOU THESE ADVANTAGES:

1. Smooth, corrosion-proof inside surfaces. No pitting or rough spots on pipe's inner walls.
2. Acid and alkali-resistant porcelain withstands tendency to fracture or corrode.
3. Illinois porcelain pipe prevents wet spots caused by condensation.

Write today for illustrated catalog #C-2, covering the ILLINOIS line of standard porcelain products. Types and sizes to meet your specific requirements. Your inquiries concerning special porcelain needs are welcome.

WITH ILLINOIS PORCELAIN PIPE LINES YOU GET . . .

★ *Quality Control*
No changes in composition of material during its handling in the plant.

★ *No Electrolitic Action*
Non-absorbent porcelain does not pick up minerals or metals in material being handled.

★ *Production Cost Savings*
Corrosion-proof porcelain cuts maintenance. Spoilage in materials is reduced because porcelain is permanent.

CHEMICAL
ILLINOIS
ELECTRIC PORCELAIN CO.
MASCOMB, ILLINOIS

president of Allegheny Ludlum. It was right after the West Leechburg and Dunkirk open houses, and Batcheller was full of justified pride for the community relations job AL is running. During the course of conversation he told about another plan AL has which is worth passing on.

Thought Leaders

Once a year at each of the company's principal plants, usually in the early spring, the company hires the largest hall it can find in the vicinity, usually a high school auditorium, and issues invitations to the so-called "thought leader" groups of the community.

Those invited: local politicos, union leaders, merchants, clergy, doctors, representatives of civic groups. A group of employees is also asked, usually determined by lot or some means that will give everyone a chance to be chosen. The size of the hall will limit the number that can be invited.

The idea of these meetings is real community relations—to tell the community what the plant has done to make the place a better community to live in. AL officials tell the assembled group a lot of things that many an executive would shudder at having known. Here are some of them.

The plant payroll, what proportion it was of the community's total income.

Taxes paid locally, what proportion they were of the total cost of operating the community.

Utility expenses, what proportion they were of the total used in the area.

But AL goes farther. It not only gives its tax bill but points out what the local citizen would have his bill raised by if the plant were not there. The same with utilities—how the company's electric bill allows large-scale economies and holds down domestic rates.

Discussion Period

All in all, the company tries to tell the community openly not only what it has contributed but also what the community has meant to company success. And there is a question and answer period too.

It sounded like a good idea, but this reporter had one worry. A plan like this could easily work in a small community where folks are civic conscious, close knit. But could it work in a large city, where people are less interested in civic affairs, commute long distances to work. Batcheller answered that question easily: "Why not? The idea has worked perfectly for us in Albany and it's working equally well for others in large cities."

It is a scheme that might be tried by other companies.

NEVILLE
The most complete line of
Resins
NEVINDENE*
NEVILLAC*
PARADENE*
NUBA*
"G" RESIN
"R" RESINS
465 RESINS
Colors
From pale amber to dark brown
Melting Point
5° to 160° C
Uses
In the production of adhesives, electrical insulation, concrete curing compounds and chewing gum.
In the manufacture of floor tile, lacquers, linoleum, paints, paper and pipe coatings, textile coatings, wood penetrants, inks, etc.
In compounding natural and synthetic rubber.
Write for information on their uses in your products!
THE NEVILLE COMPANY
PITTSBURGH 25, PA.
Chemicals for the Nation's Vital Industries
BENZOL • TOLUOL • CRUDE COAL-TAR SOLVENTS • HI-FLASH SOLVENTS
COUMARONE-INDENE RESINS • RUBBER COMPOUNDING MATERIALS • TAR PAINTS
WIRE ENAMEL THINNERS • PHENOTHIAZINE • ALKYLATED PHENOLS
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

Ryerson Answers Important Steel Questions

What can we get?

You can usually get enough carbon, alloy or stainless steel from stock to meet maintenance and repair requirements—and some new equipment needs as well. Tremendous demand often limits the amount that can be shipped, but stainless is in particularly good supply—in fact both alloy and stainless bar stocks and carbon and stainless tubing stocks are better than average. See the product list below.

Where can we get it?

For next-door steel service, call your nearest Ryerson plant or office. The nationwide network of Ryerson plants brings steel stocks within short shipping distance of almost any delivery point. As an added convenience for steel buyers, Ryerson maintains sales offices in many cities, connected by direct wire to a neighboring plant.

When can we get it?

When the steel you need is on hand, you get delivery promptly from Ryerson—24-hour service in emergencies. If your requirements are not immediately available, we may be able to suggest workable alternates. We will certainly do our best. And remember, our stocks turn over quickly. We may have kinds and sizes tomorrow that are out of stock today.

So call our nearest plant or office when you need steel. We will be glad to work with you.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

PRINCIPAL PRODUCTS:

BARS—Carbon & alloy, hot rolled & cold fin., reinforcing
STRUCTURALS—I beams, H beams, channels, angles
PLATES—Sheared & U. M. Inland 4-Way Floor Plate
SHEETS—Many types
TUBING—Seamless & welded mechanical & boiler tubes
STAINLESS—Allegheny sheets, plates, bars, tubes, etc.
BABBITT—bearing metal
MACHINERY & TOOLS—for metal fabrication

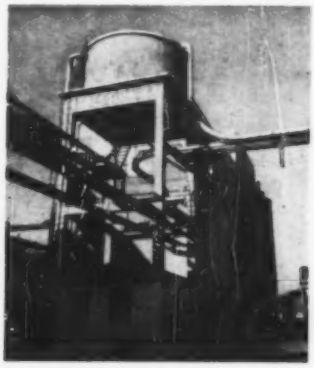
RYERSON STEEL

CHEMICAL ENGINEERING NEWS

Richard F. Warren, ASSISTANT EDITOR

Weyerhaeuser Opens New Kraft Mill at Longview, Wash.

INSIDE building is huge blow tank which takes cooked mass blown from battery of digesters. Raw material is scrap wood.



OUTSIDE of digester building shows size of battery which can make 200 tons of kraft pulp per day in the new unit.

Alkali Industry Presents Its Case to Congress

PRICE systems in the chemical industry were explained to the Capehart Committee last month. Industry experts explained why they wanted clarification of the present confusion created by basing point decisions. Robert D. Pike, consulting chemical engineer, spoke on behalf of the Westvaco Chemical Division, Food Machinery Corp. He explained that Westvaco's deposit of natural trona is sufficient to provide the entire domestic need for soda ash for 35 years, but that it is in an area far removed from the major markets. The product has to be shipped great distances to consumers, compared with the distance that ammonia-soda type ash has to travel to the customer. Since the economic importance of the Westvaco deposits is derived from the relatively pure state of the trona and the ease of manufacture, transportation costs are a major problem. A check of locations of the various ammonia-soda plants shows that companies such as Solvay are operating more than one advantagously located unit and largely escape the effects of the uniform mill price because separate plant locations result to a considerable extent in meeting competitive prices, while maintaining a uniform mill price. Mr. Pike pointed out that a producer like Westvaco could only meet this competition by competitive freight equalization. He said that this same situation also applied to the production of potassium fertilizers from trona in Wyoming because the major fertilizer markets are in the eastern part of the country. With these facts in mind, the company certainly can not risk the investment required in developing the Wyoming deposits unless it is sure it has a legal right to pay part of the freight charges to meet competition of soda ash plants in the East and West.

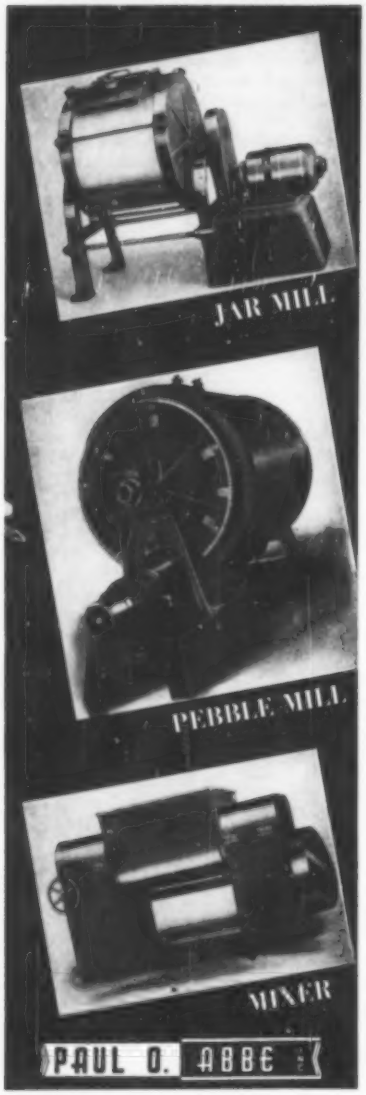
Bert Cremers, vice president of Wyandotte Chemicals Corp., explained the importance of the alkali industry in the national economy. He pointed out the need for cheap alkali chemicals in bulk quantities, and explained how the present pricing system for alkalis developed. Mr. Cremers showed the committee that alkali plants cannot be located "just anywhere." That it is uneconomical for consumers of these chemicals to relocate their plants near a source of supply. He said that the present method of freight equalization enables a customer to insure stability of supply by providing more sources. It enables new and smaller customers, regardless of location, to get their chemicals at a price that let them compete with larger firms. Under the present system we have become the greatest chemical producing country in the world. He urged that Congress remove the confusion that exists in the pricing pictures by proper legislation.

"Specifically, we request that it be

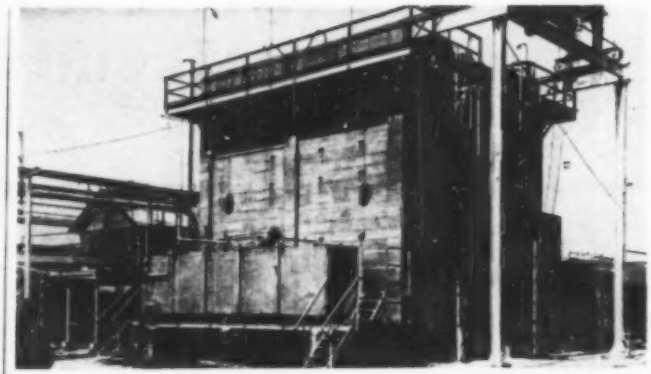
FIRST OF SIX large barges designed to haul sulphur and salt was launched last month by Dravo Corp. The 240-ft. units will be used in two-barge teams.

EACH ONE
THE BEST
FOR ITS
PURPOSE

PAUL O. ABBÉ



375 Center Ave., Little Falls, New Jersey



Iso-octyl alcohol is produced in this high pressure unit by Esso Standard at Baton Rouge, La. Reactors operate at 3,000 psi. The unit can be used to make other chemicals. Crude storage tanks in the foreground feed into refining units.

declared lawful to couple an offer to equalize freight with the nearest competitive producing point with an original price quotation in the sale of heavy chemicals," Mr. Cremers said in concluding.

Jefferson Research Center Planned at Austin

JEFFERSON CHEMICAL CO. will centralize research and development work heretofore carried on in New York and Port Arthur, Tex., at a new location on the highway between Austin, Tex., and Dallas. The center will be in the northern part of Austin. The company says that a major element in choosing Austin was the availability of the library and certain other facilities at the University of Texas.

Austin is about 270 mi. from Port Neches, where Jefferson opened its new plant this year for manufacturing ethylene glycol, ethylene oxide and ethylene dichloride from petroleum gases furnished from the nearby refinery of the Texas Co. at Port Arthur. Jefferson is owned jointly by the Texas Co. and American Cyanamid.

Jefferson has obtained a 69-acre tract at Austin and plans to install initially a staff of about 65 technologists and operators. The company is carrying out a large research program directed toward the development of processes to produce intermediates and bulk chemicals from petroleum raw materials.

International Minerals Opens Shreveport Office

A NEW district sales office at Shreveport, La., for its potash division has been established by International Minerals & Chemical Corp. The office is under supervision of Henry C. Aaron as district manager.

The district comprises Texas, New Mexico, Oklahoma, Louisiana, Arkansas, Mississippi and the western part of Tennessee. Before taking over the Shreveport office, Aaron had been resident salesman for the area during the last five years under the supervision of the district office at Atlanta, Ga.

Cooperative's Plans For Fertilizer Unit Progress

PLANS are being carried forward to ask Arkansas planters to help finance the construction of a plant to manufacture mixed fertilizers at an investment of at least $600,000. The project was worked out by the Arkansas Farm Bureau Cooperative with the support of the Arkansas Farm Bureau Federation. The tentative list of products includes, in addition to mixed fertilizers, liquid ammonia, potash and superphosphate.

As plans stood last month, half the investment will be financed by sales of stock to planters and the remainder by a loan from the St. Louis Bank for Cooperatives, according to a Farm Bureau spokesman. Stock sales were scheduled to begin early in January. The Atlanta Utility Works, Atlanta, Ga., was reported as completing the design for the project last month.

Rayon Pulp From Hardwood Waits for Election

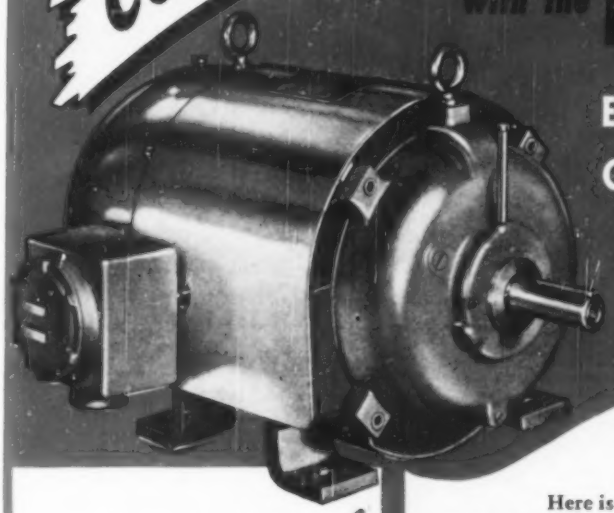
A BOND election in Mississippi this month may determine where International Paper Co. will build its projected plant for manufacturing rayon

COMPLETE INSURANCE

with the **RELIANCE**

EXPLOSION-PROOF and CORROSION-RESISTING

MOTOR



Selected Materials and Design Features

OFFER MAXIMUM PROTECTION!

FOR CORROSIVE ATMOSPHERES

The Totally-Enclosed Fan Cooled A-c. Motor for Applications where Chemical Atmospheres Prevail

and

FOR ATMOSPHERES CONTAINING HAZARDOUS GAS OR INFLAMMABLE LIQUIDS

Underwriters' Class 1, Group D Explosion-Proof A-C. Motor

Here is the result of Reliance engineering applied to the problem of protecting motors that operate in either corrosive or explosive atmospheres. Frame and fan covers, fan, conduit box and end brackets are all made of selected corrosion-resisting materials. In addition, many extra steps are taken to achieve maximum protection, such as coating screws, counterboring screw holes and fitting-up with special compounds.

Reliance *Precision-Built* Motors offer you the *right* motor for any application. For further information about this explosion-proof, corrosion-resisting motor, write for Bulletin C-130.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

1063 IVANHOE ROAD • CLEVELAND 10, OHIO

GB

does the whole job in this modern plant

DESIGNING—ENGINEERING

Where man, problems of unusual design detailing are worked out by our competent engineering and technical staffs.

CASTING

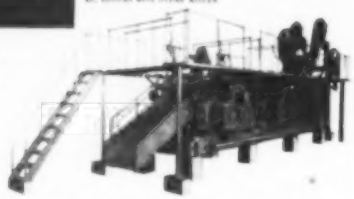
Any kind or shape of grey iron or alloy iron castings up to 40 tons can be made in our modern foundry.

WELDING—FABRICATING

This shop is not only equipped for all standard welding procedures including helium arc, but specializes in welding de-oxidized copper, everdur, nickel, monel and other alloys.

MACHINING

Our heavy machine shop is equipped with a full complement of oversize machine tools in addition to standard size machines working daily in stainless steel, copper, bronze and various iron and steel alloys.



ASSEMBLY—TESTING

Where equipment is pre-assembled for match marking and testing.

Whether your requirements call for standardized or specialized equipment, G-B has the *men, machines and know-how*. Your inquiries are invited.

GOSLIN-BIRMINGHAM MANUFACTURING COMPANY, Inc.

BIRMINGHAM, ALABAMA

CHICAGO
F. M. deBeers and Associates
20 N. Wacker

NEW YORK
Goslin-Birmingham
350 Madison Ave.

pulp for the first time from hardwoods. The Mississippi Agricultural and Industrial Board has received applications from the city of Natchez and Adams County for authority to hold an election to vote $300,000 in bonds to buy the plant site and rights of way for the company.

New Gum Processing Plant in Florida

THE GLIDDEN CO. will join with other interests in operation of a modern gum processing plant in Jacksonville, Fla. The company will not rebuild the rosin unit destroyed by fire in 1947, but will join with Turpentine and Rosin Factors, Inc., and the Varn interests of Jacksonville and Palatka in forming the Jacksonville Processing Corp.

P. E. Sprague, vice president of Glidden, said that the plant in Jacksonville will supply raw material for Glidden's manufacture of synthetic chemicals derived from rosin and turpentine, resin compounds and specialty products.

Glidden will concentrate its gum

CONVENTION CALENDAR

American Society of Heating and Ventilating Engineers, 9th International Heating and Ventilating Exposition, International Amphitheater, Chicago, January 24-28.

Chemical Market Research Association, winter meeting, Biltmore Hotel, New York, February 10.

American Institute of Chemical Engineers, regional meeting, Los Angeles, Calif., March 6-9.

American Chemical Society, 115th national meeting, San Francisco, Calif., March 27-April 1.

American Society of Brewing Chemists, annual meeting, Roosevelt Hotel, New Orleans, April 10-14.

National Association of Corrosion Engineers, annual conference and exhibition, Netherlands-Plaza Hotel, Cincinnati, April 11-14.

American Ceramics Society, national meeting, Netherlands-Plaza Hotel, Cincinnati, April 24-28.

Electrochemical Society, spring meeting, Benjamin Franklin Hotel, Philadelphia, Pa., May 4-7.

American Oil Chemists Society, annual meeting Hotel Roosevelt, New Orleans, May 9-10.

Manufacturing Chemists Association, annual meeting, Skytop, Pa., June 2.

22nd Exposition of Chemical Industries, Grand Central Palace, New York, November 28-December 3.

CHEMICAL *Stability* Plant and Personnel *Protection*

● For many years "the only completely satisfactory answer to many corrosion and contamination problems," genuine Lapp Chemical Porcelain is now available in a series of valves completely armored in acid-resisting heat-treated silicon aluminum. Choose the Lapp armored porcelain valve over expensive alloy or lined valves for greater economy—chemical stability—plant and personnel protection against carelessness or accident. Standard bolt flanges integral with armor. Y-valves in 1", 1½", 2", 3", 4" and 6" sizes; angle valves in 1" and 2" sizes; flush valves in 1½", 2" and 3" sizes (for tank outlets 3", 4" and 5"). Write for descriptive literature and specifications. Lapp Insulator Co., Inc., Process Equipment Division, 101 Maple St., LeRoy, N. Y.

ANGLE VALVE

Lapp ARMORED PORCELAIN VALVES

Y VALVE

FLUSH VALVE

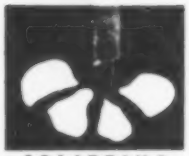
Lapp

PROCESS EQUIPMENT

CHEMICAL PORCELAIN VALVES • PIPE • RASCHIG RINGS

PULSAFEEDER CHEMICAL PROPORTIONING PUMPS

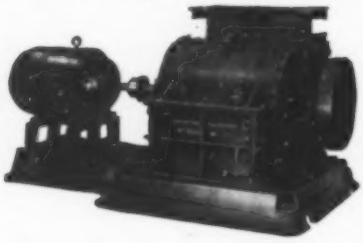
WHAT IS YOUR CRUSHING PROBLEM?



SPLITTING

SHATTERING

There's an AMERICAN CUSTOM-BUILT CRUSHER *that meets your requirement*



American Crushers are not "all-purpose" crushers—Americans are custom-built to fit the specific requirements of the material hardnesses, fibrosity and hydroscopy. Americans provide great flexibility and various reduction actions in capacities up to 500 TPH.

Send samples of your material to our laboratories—our engineers will be glad to make recommendations.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1219 Macklind Ave.
St. Louis 10, Mo.

FILTER UNITS by MULTI-METAL

THE superior construction and improved materials of Multi-Metal Filter Units give longer, more trouble-free service resulting in increased production. In addition, because of their advanced design, Multi-Metal Filter Units often can greatly improve the efficiency of existing processing installations.

The skill and experience gleaned from 35 years of intensive specialization are at your service when you place your process problems in the hands of Multi-Metal experts.

Send for free catalog and wire cloth samples, or send prints and specifications for an immediate quotation.

Always in stock—wire and filter cloth of all meshes, weaves, and metals. Order by the yard or piece.

Wire Cloth in Fabricated Units or by the roll and the cut piece

Multi-Metal
WIRE CLOTH COMPANY, INC.
1350 Garrison Ave., New York 59, N. Y.

turpentine and rosin operations at Valdosta, Ga., and make its naval stores division plant there the largest pine-gum processing plant in the world. The plant will have a processing capacity of 150,000 bbl. of pine gum annually. Gum will be stored to insure continuous operation.

Carbide and Carbon Wants Ohio Coal Property

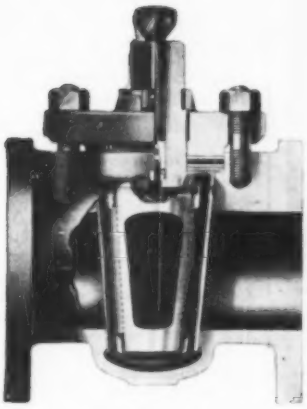
THE Union Carbide and Carbon Co. of New York, parent corporation of Electro Metallurgical Co., National Carbon Co., and Bakelite Co., which are planning to build plants between Marietta, O., and Parkersburg, W. Va., is reported to be negotiating for the purchase of the coal mining equipment and leases owned by Testa Bros. Inc. in Noble county, Ohio. The deal is reported to involve around a million dollars. The parent company could use coal mined in Noble County in the power plant they are planning to build near Marietta. If the deal goes through, it is reported that Union Carbide and Carbon will continue to manage the operations from the present Testa Bros. headquarters in Dexter City, and will build an office building there. Testa would retain its other properties in Ohio and West Virginia.

Market Research Index On Chemicals Under Way

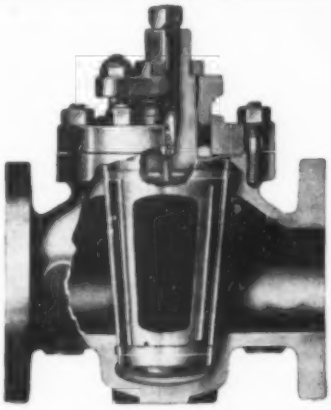
MARKET research information is being made available to interested parties in the form of an abstracting and indexing system. The information is being abstracted by Mr. Oliver Goddard and compiled by Dr. John R. Skeen, market research department, Foster D. Snell, Inc. The firm will supply a summary each month of any information that appeared in the literature (50 trade journals and major government publications). This summary will be broken down into chemicals. Since abstracts on many chemicals will total less than two pages annually, the company plans to allow interested parties to select any number of chemicals sufficient to provide full pages of information each month.

Columbia to Give Industrial Heat Flow Course

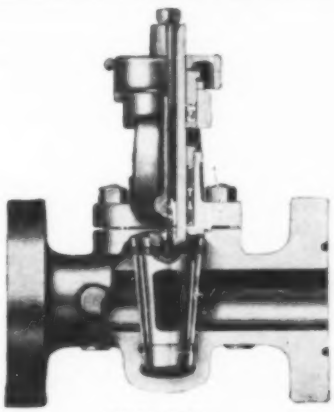
A SECOND semester course in special heat flow problems in industry is to be given at Columbia University through cooperation of the university's mechanical engineering department. The course will be non-mathematical and presupposes only a knowledge of elementary heat transfer. It is open



Single Gland Type



Regular Gland Type



Ball Bearing Type

FOR HANDLING

Acids... Solvents... Sludges...

and other troublesome liquids—

USE WALWORTH LUBRICATED PLUG VALVES

When handling acids, condensates, dyes, oils, solvents, solutions, slurries and hundreds of similar "troublesome" liquids, you get better control, more dependable service and lower operating costs with Walworth Lubricated Plug Valves.

These valves have proved their ability to give easy operation . . . fast action . . . tight shut off . . . greater protection against corrosion. Turning is smooth and easy; just a ¼ turn from full-opening to full-closing. Moreover, Walworth Lubricated Plug Valves are tightly sealed against leaks — *whether open or shut.*

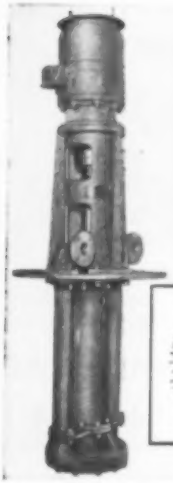
Walworth Lubricated Plug Valves are available in sizes ½" to 26" for pressures from 125 to 5,000 psi, and for vacuum requirement. For further information about Walworth's Complete Line of Lubricated Plug Valves, see your Walworth distributor or write for Catalog No. 46L.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

Pumping an Abrasive-Corrosive Fluid at 850° F



A newly-devised heating system circulates an abrasive-corrosive salt mixture at 850° F and even higher. To meet these tough requirements Lawrence engineers designed a vertical centrifugal pump with bearings and packing box outside the storage tank. An extra heavy shaft, in conjunction with dual opposed discharge outlets, minimize vibration and wear. All submerged parts are made of special alloys highly resistant to corrosion and abrasion of the hot mixture.

Difficult pumping problems like the above have been our specialty for eighty-five years. Perhaps we can help you.

Ask us — no obligation.

LAWRENCE
MACHINE & PUMP CORPORATION
369 MARKET STREET, LAWRENCE, MASS.

the right filter base

● If you choose the wrong filter base, improper filtration and higher costs may result. Sperry's expert engineers, on the other hand, will study your particular problem and recommend the filter base to do your filtration job right.

Sperry supplies a complete line of filter bases, too . . . in paper, cloth, vinyon, asbestos, rubber and woven metals, as well as special bases for special requirements.

Call on Sperry for a complete analysis of your problem. We'll specify the right filter base for more efficient and economical filtration. There's no obligation.

D. R. SPERRY & COMPANY, *BATAVIA, ILLINOIS*
Filter Base Division

SPERRY FILTER BASES

to anyone in industry, although it can be used for academic credit. To be given by Dr. Victor Paschkis who developed the heat and mass flow analyzer, it will be held from 7 to 9 on Wednesday evenings, starting Feb. 2. Registration days are Jan. 26-29 and the registration fee, $50.

Mellon Institute Starts Smoke Control Study

LAST MONTH Dr. E. R. Weidlein director of Mellon Institute established a research fellowship sponsored by the Western Pennsylvania Coal Operators Association. The program of this fellowship, started this month, will embrace scientific studies of the causes, prevention and control of coal-refuse fires. Dr. William L. Nelson will head the fellowship. He will investigate the reactions of coal and inorganic sulfides, especially at low temperatures, and will study all factors entering into the problem of the spontaneous combustion of coal-waste, particularly where heaped or piled. In this work he will have the advisory guidance of Dr. George D. Beal, assistant director of Mellon Institute, and of a technical committee constituted of Charles B. Baton, Greensburg-Connellsville Coal and Coke Co., Henry F. Hebley, Pittsburg-Consolidation Coal Co., J. B. Morrow, Pittsburgh Coal Co., and Harry A. Sutter, executive vice president of the sponsoring association.

New England Protective Coating Center Formed

A LABORATORY and service center of paint, varnish, and lacquer technology is now in operation in the Northeastern University department of chemical engineering. It is subsidized by the protective coating industry in New England. The program carries on fundamental research for the improvement of the paint and varnish industry. The research project now under consideration deals with factors affecting the grinding of pigments in coating vehicles.

Experimental work to date has considered the effect of above-room temperatures for improving the grinding operation, in a ball mill, of viscous pastes composed of high percentages of pigment and binder. Also considered, were below-room temperatures on highly pigmented pastes having a high percentage of volatile material.

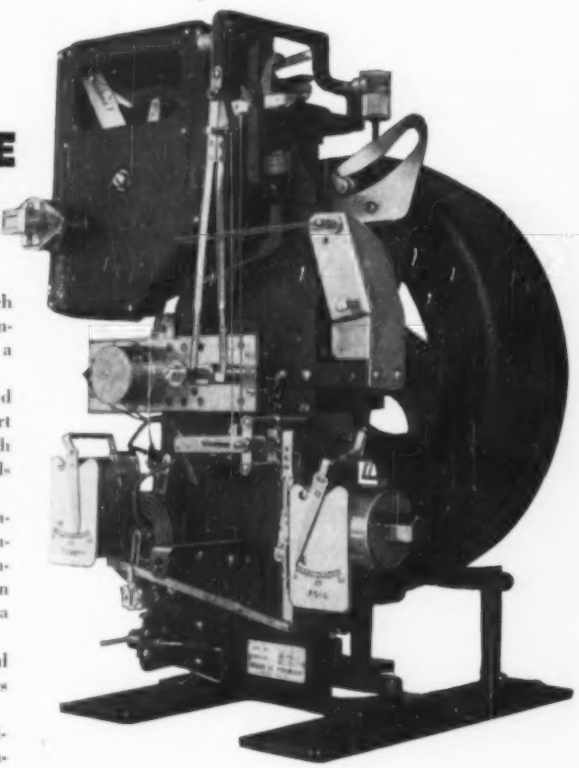
At a recent meeting of the New England Paint and Varnish Production Club a progress report of the results accumulated thus far was presented by Joseph Vozzella, research

automatic **compensation**

for pressure or temperature or BOTH

with

HAGAN RING BALANCE FLOW METERS



When gas pressure departs from that for which the orifice was calculated, readings of conventional flow meters require the application of a "correction factor."

In Hagan Ring Balance pressure compensated flow meters, correction is automatic. The chart reading *is* the compensated reading, although both compensated and uncompensated records on the same chart can be obtained if desired.

This meter can also be supplied for temperature compensation, either alone or in combination with pressure compensation, and a temperature record may be added to the chart. In fact, a total of four records can be made on a single chart.

An integrator, operative between 2% and 100% of chart reading, automatically totalizes the compensated flow.

The Ring Balance principle makes the addition of pressure and/or temperature compensation so simple that it is a *standard model in the Hagan Ring Balance line*—not a special "problem child."

Measurement of gas flow is only one application of these extremely versatile meters. For full information on Hagan Ring Balance Meters or on specific metering problems write to Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

HAGAN HALL BUROMIN CALGON

HAGAN CORPORATION

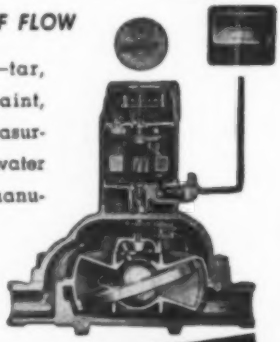
RING BALANCE FLOW AND PRESSURE INSTRUMENTS
THRUSTORQ FORCE MEASURING DEVICES
BOILER COMBUSTION CONTROL SYSTEMS
METALLURGICAL FURNACE CONTROL SYSTEMS

NEW

HAYS Veriflow
TOTALIZING-INDICATING
METER

Featuring
REMOTE INDICATION OF RATE OF FLOW

For practically all liquids—tar, molasses, crude oil, grease, paint, varnish, syrups, etc., etc.—for measuring, indicating, totalizing flow of water and chemicals in continuous manufacturing processes and numerous other uses. Its remote indicating feature is new—get the complete story.



SEND FOR BULLETIN. 46-766

THE HAYS CORPORATION
COMBUSTION & INDUSTRIAL CONTROLS
MICHIGAN CITY, INDIANA, U.S.A.

J&C ZENITH
CONTINUOUS PULP PRESS

JACKSON & CHURCH COMPANY'S ZENITH CONTINUOUS PULP PRESS offers GREATER efficiency and GREATER profits . . . with the hydraulically-operated cake discharge port or "floating cone."

Long the finest dewaterer on the market, Zenith's new 100% automatic operation assures CONSTANT, UNIFORM discharge pressure at any pre-determined degree. Finger-tip adjustment assures drier cake of uniform consistency.

These engineering triumphs . . . found only in Zenith Press . . . are available to paper pulp, cannery, corn starch, fish reduction, meat packing, glue, citrus waste drying and many other processes.

For further plant uses, for individual problems or for engineering or additional data, write Jackson & Church Company at Saginaw, Michigan.

A PRODUCT OF
JACKSON & CHURCH COMPANY, SAGINAW, MICHIGAN
"Work well done since '81"

associate. Professor Chester P. Baker, director of the program, summarized the types of projects started this fall by a group of senior chemical engineering students at Northeastern. A set of five volumes on protective and decorative coatings, edited by the late Dr. Joseph J. Matiello, will be presented to the senior with the best project report at the end of the year.

Oak Ridge Isotopes Will Help Fertilizer Industry

Cheaper methods for manufacture of phosphorus fertilizers seem possible through research with radioisotopes produced at Oak Ridge, in the opinion of R. M. Boarts, professor of chemical engineering at the University of Tennessee.

Professor Boarts says that with radioactive phosphorus will decrease the required use of the costly phosphoric acid. Research would determine the amount of phosphorus absorbed by plants from the soil as compared with the amount taken up from fertilizer applications.

Plans are being made to carry on such type of research in the Atomic Research Center-Hospital projected at the University of Tennessee.

More Alcohol May Come From Sweet Potatoes

Acme Alcohol Products Corp., a new corporation organized for the manufacture of ethyl alcohol from sweet potatoes, plans to start in the near future the construction of a plant south of Lafayette, La., between Highway 90 and the Lafayette airport.

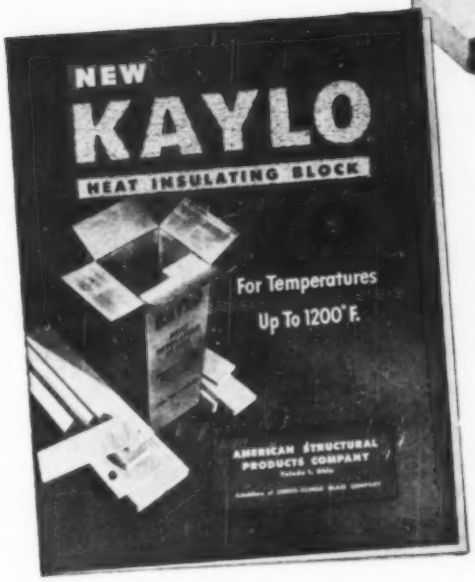
Incorporators include George L. Larriviere, of Rayne; Hillman J. Boudreaux, Ralph W. Landry, and P. R. Laughmals, of Lafayette; Angus Comeaux, Maurice and Mayo Lacour, of Lake Arthur. Mr. Boudreaux is president of the company.

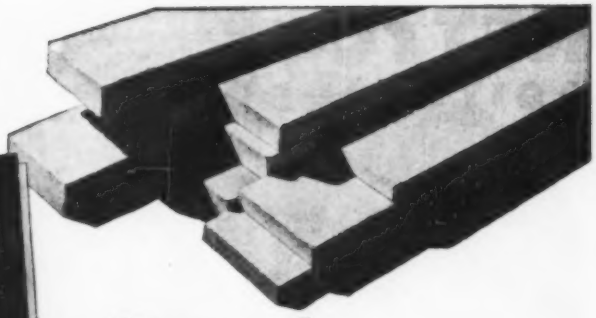
The new plant will use 20,000 tons of sweet potatoes annually and is designed to also use cracked rice or blackstrap molasses.

Colorado School of Mines To Hold Engineer's Day

The 15th annual Engineer's Day of the Colorado School of Mines will be held in Golden, Colo., on April 22, 1949. The program will feature speakers on many phases of the mineral industries as well as exhibits and scholarship examinations.

Exhibition space, both indoors and out, is available, free of charge, to all industries engaged in or related to the



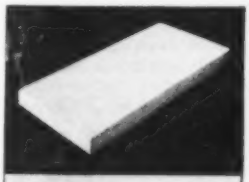


Now ready KAYLO®

LIGHT DENSITY Heat Insulating Block

BE SURE you get the facts about Kaylo Heat Insulating Block—the remarkable new insulation that's strong, lightweight and highly efficient.

Now in production in a new manufacturing plant, Kaylo Heat Insulating Block is being shipped in quantity for the first time. It has been in pilot plant manufacture for several years, and thousands of square feet of it are serving efficiently on typical heat insulation applications.



KAYLO®
Heat Insulating Block
AMERICAN STRUCTURAL PRODUCTS COMPANY
Subsidiary of
OWENS-ILLINOIS GLASS COMPANY

SEND COUPON
For Literature or Sample

Available in standard sizes, this new heat insulating block combines many valuable properties you should know about. Get complete information by mailing coupon below. No obligation, of course.

AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. F-407, P.O. Box 1035
Toledo 1, Ohio

Gentlemen:

Please send: ☐ Free illustrated booklet, "Kaylo Heat Insulating Block."
☐ Free sample of Kaylo Heat Insulating Block.
☐ Have representative call.

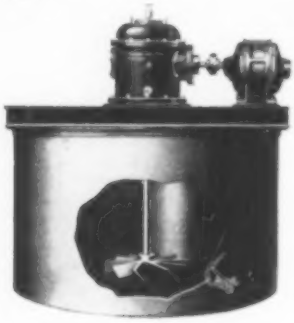
Name_____

Address_____

City_____ County_____ State_____

NETTCO
AGITATORS

Good mixers and modern processing methods go together—that's why Nettco Engineered Agitators are the choice of experienced production men. Every feature of these soundly designed, well constructed units contributes to agitating effectiveness and low operating costs. Rugged housings, precision gears, antifriction bearings, and positive leakproof design make Nettco Drives exceptionally long-lasting and trouble-free. Nettco engineering, backed by experience on thousands of installations, helps you select the right drive plus the correct stirrers and baffles. Whether you need a single drive or stirrer or a completely new agitation system, Nettco will supply you with good mixers that bring credit—and profit—to your company. Write for information.



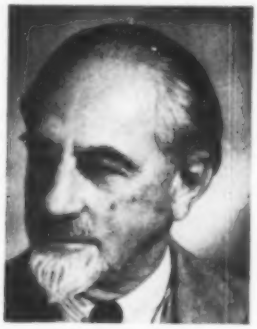
Typical Nettco Agitator, with Model T reduction gear drive and turbine stirrer. Quiet, smooth running, efficient at all ratios.

NEW ENGLAND TANK & TOWER COMPANY
87 TILESTON STREET
EVERETT 49 MASS.

discovery, extraction, and refining of minerals and petroleum. Exhibitors must, however, assemble and take down their displays. Potential exhibitors are reminded that the day affords an excellent opportunity to acquaint future mineral engineers as well as many alumni and visitors with their products and organizations.

Complete information concerning any point of the day's activities may be obtained by writing J. Robert Medaris, Chairman of the Engineering Day Committee, Golden, Colo.

Elmer R. Ramsey

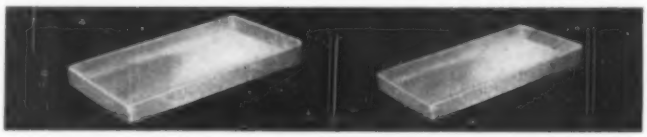


John V. N. Dorr

John V. N. Dorr Assumes Chairmanship of Dorr Company as Elmer R. Ramsey Becomes President

On January 20 Dr. John Van Nostrand Dorr, founder and president, moves into the newly created office of chairman of the board of directors of the Dorr Co., Inc. Elmer R. Ramsey, who has been associated with Dr. Dorr since 1914 and in recent years has served as operating vice president,

AMERSIL* SILICA TRAYS



—are suitable for repeated applications involving temperatures up to 1000°C. These trays are chemically inert—will not contaminate material treated—will withstand extreme thermal shock. For applications demanding temperatures over 1000°C., Amersil Trays may be used for short periods.

TYPICAL APPLICATIONS

Roasting of fluorescent powders, ores and pigments.
Sintering of powdered metals.
Corrosive chemical handling.

Amersil Silica Trays are available in stock sizes and special sizes on short order. Flat, overlapping or matching covers can be furnished.

Write to Dept. "CE" for further information.

*Trade Name Registered

AMERSIL COMPANY Inc.
CHESTNUT AVENUE ENGELHARD HILLSIDE 5, N. J.

YOU USE 4 + 8 YOU GET 100,000

That's all it takes! Four basic circuits and 8 basic component parts give you more than 100,000 different electronic instrument combinations for processing use.

Flow, level, speed, pressure, temperature, gas analysis, pH, conductivity, etc.—all can be controlled with these interchangeable Bailey units.

With Bailey controls, replacement part stocks are held to a minimum because parts are interchangeable. Maintenance costs are less, too, because maintenance men quickly become familiar with the standardized Bailey units.

Bailey bulletin No. 17 shows how you can use this improved control system. Write for your copy and keep it handy for reference the next time you need process controls.

P-19

BAILEY METER CO.
1054 Ivanhoe Rd. • Cleveland 10, Ohio
BAILEY METER CO. LIMITED, MONTREAL
Controls for the Chemical Industry
TEMPERATURE • FLOW • PRESSURE
GAS ANALYSIS • LEVEL • RATIO

4 + 8 Works Here at the Wyandotte Chemicals Corporation North Plant, Wyandotte, Michigan

PLAY SAFE ... specify CATAWISSA

there is a difference!

NEW PLANT OR OLD...

Catawissa UNION and VALVE dependability means LOWER MAINTENANCE COSTS ... with an EXTRA margin of safety!

HOT FORGED STEEL AND STAINLESS STEEL UNIONS

STANDARD
1/8" TO 3"
Cold-Working Pressure up to 2,000 pounds.

DOUBLE EXTRA HEAVY
1/8" TO 2"
Cold-Working Pressure up to 6,000 pounds.

The Catawissa seat design gives you a perfect seal for every installation -- even when the pipe is not properly aligned -- with its 55-degree angle on the female end to a ball on the male end!

HOT FORGED STEEL SWING CHECK VALVES,
ESPECIALLY ADAPTED FOR HIGH TEMPERATURE & HIGH PRESSURE SERVICE!
For boiler injection--engineered to outlast the boiler! Efficient, easily accessible!

See your industrial supply distributor -- or write direct for a copy of BULLETIN 10-A

CATAWISSA VALVE & FITTINGS COMPANY
100 Mill Street
CATAWISSA, PENNA.

CATAWISSA
UNIONS * VALVES

was elected president of this international engineering organization.

The purpose of the moves, according to a statement by Dr. Dorr, was to relieve him of many of the administrative details associated with the active direction of the Dorr enterprises in order that he might direct more time to studying and guiding future development of the company.

Incidental to this change in management, and as a further development of its incentive plans, the Dorr Co. recently offered shares of a new tenure stock to 50 senior members of its engineering and business staffs. This stock, held during the period of active employment, gives key staff members a substantial voice in the management of the company.

Elmer Ramsey, the new Dorr Co. president, joined the company in April, 1914 as a junior engineer, two years after he graduated from Colorado School of Mines. He rose to the position of western manager of equipment sales in 1920. He was transferred to New York in 1927 and after filling a succession of important positions, was elected vice president in charge of engineering in 1944 and operating vice president in 1946. He has been a director and member of the executive committee since 1933. Mr. Ramsey is a resident of Larchmont, N. Y., a member of the American Institute of Mining and Metallurgical Engineers, the Mining and Metallurgical Society of America, and the engineering fraternities Tau Beta Pi and Theta Tau.

Tung Growers Form Council At Louisiana Meeting

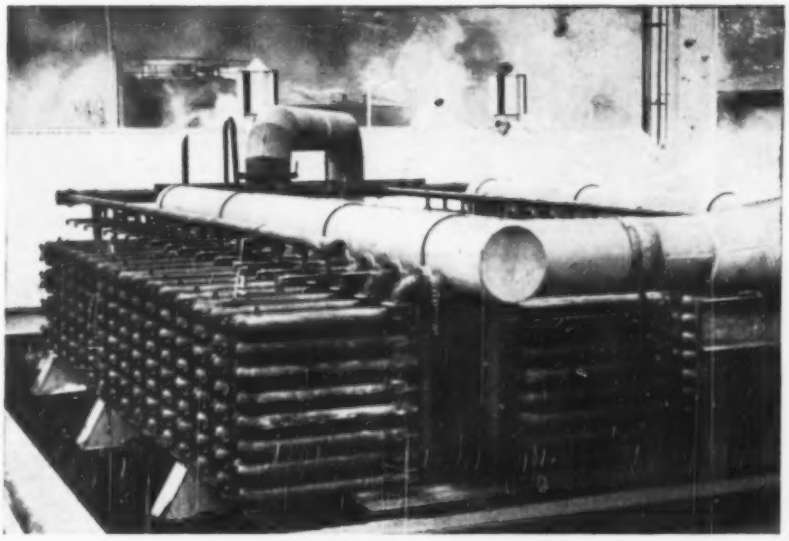
Tung growers from five Southern States organized the Tung Growers Council of America at a meeting Nov. 20 in Picayune, Miss. Lamount Rowlands, of Picayune, headed the founders of the council and has been named chairman of the steering committee.

Mr. Rowlands said that the immediate objective of the council would be to "push the fight for obtaining an adequate support price for the 1948-49 crop of tung nuts and tung oil; and a Congressional hearing on continued dumping of vast quantities of Chinese tung oil on the American market in violation of the anti-dumping act of 1921."

The newly formed council pointed out that its efforts will be directed toward encouraging and development of new and better uses for tung oil. It will push new outlets for the tung crop through utilizing the possibilities of the green tung fruit itself.

Those at the organization meeting included Dr. Ernest Angelo of Folsom, La., president of the East Louisiana

FOR *Versatility*



NATIONAL Cast Iron CONDENSING and COOLING SECTIONS

Cast Iron, one of the oldest metals used in the Process Industries, has proven its suitability for handling a wide variety of materials. Because of their ability to withstand the corrosive action of many liquids and vapors National Cast Iron Condensing and Cooling Sections are being used in such widely diversified services as the following:

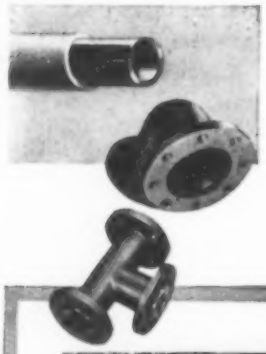
Petroleum Vapor Condensers **Tar Vapor Condensers** **Solvent Condensers**
Benzol Condensers **Pyridene Condensers** **Steam Condensers**
Sulfuric Acid Coolers **CO_2 Coolers** **Absorption Oil Coolers**
Alkali Coolers **Ammonia Liquor Coolers** **Gas Coolers**

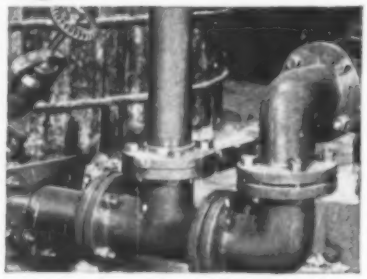
When selecting your future Condensers or Coolers, please contact our representative in your area or write for our Catalog CP-16.

NRC

INDUSTRIAL DIVISION
THE NATIONAL RADIATOR COMPANY
JOHNSTOWN, PENNSYLVANIA

saran lined steel pipe





resists corrosion

- reduces shut-downs and lost production!
- saves time and labor!
- readily field-fabricated!

The conveyance of corrosive liquids can prove as hard on profits as it is on equipment. Saran Lined Steel Pipe is designed and constructed to protect YOUR profits. It combines the desirable features of steel pipe—rigidity and pressure strength—with Saran's unusual resistance to most corrosive chemicals, solvents, and erosion. Another advantage is ease of field fabrication. For general service, Saran Lined Steel Pipe can be used at temperatures between —40° and 190°F.

Saran Lined Steel Pipe comes in maximum lengths of 10 feet and in sizes from 1 to 4 inches. Plug valves and fittings, also Saran Lined, include elbows, tees, companion and reducing flanges, and gaskets. AVAILABLE IMMEDIATELY. Write us today for further information concerning Saran Lined Steel Pipe and how it can solve your problem. Manufactured by The Dow Chemical Company, distributed nationally by Saran Lined Pipe Company.

SARAN LINED PIPE COMPANY
702 Stephenson Building
Detroit 2, Michigan

Offices in: New York • Boston
Philadelphia • Pittsburgh • Chicago
Tulsa • Indianapolis • Houston
San Francisco • Los Angeles
Portland • Seattle • Toronto
Denver • Cleveland

DOW
CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Tung Growers Association and of the Ozone Tung Co-operative at Covington; Sam R. Greer, president of the Pearl River Tung Growers Association; S. G. Thigpen, tung grower and president of the Picayune Chamber of Commerce; Claude E. Beebe, of Defuniak Springs, Fla., president of the Tri-State Tung Growers Association, representing growers of Alabama, Georgia and Florida; and prominent tung growers in the Louisiana and Mississippi area.

Engineers Hold Stream Pollution Symposium

POTOMAC RIVER and Chesapeake Bay drainage basin is a typical industrial area where stream pollution is an important problem. Four speakers discussed this subject before the Chemical Engineers Club of Washington at the first symposium meeting of the current season, December 6.

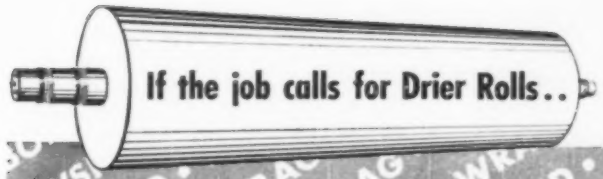
Character, extent, and consequences of pollution existing within the scope of the Maryland Water Pollution Control Commission was described by Frank C. Wachter, a member of the commission. Maryland is one of the east coast states which have been active in recent years in establishing pollution abatement and control. Response to the commission's efforts have been highly gratifying with many industries and municipalities responding helpfully.

A realistic attitude is held by the commission. While all streams of the state probably can not be brought up to drinking water quality, the most serious problems of damage or nuisance are being attacked. Every effort is being made to accomplish the desired result with a minimum expense and a maximum of cooperation between the commission and affected groups.

Abel Wolman spoke on the technology of pollution control and abatement from his point of view as sanitation engineer at Johns Hopkins University.

Problems of pollution control in the chemical industries were touched on by Lyman Cox, waste disposal consultant with Du Pont at Wilmington. He is a member of the Stream Pollution Abatement Committee of Manufacturing Chemists' Association and has had long experience with these problems. In his opinion, approximately 50 percent of the organic wastes arise from municipalities and 50 percent from industrial sources. The bacterial and physical contamination come principally from non-municipal sources.

Fundamental requirement in any stream pollution problem is thorough



If the job calls for Drier Rolls..

A SURVEY OF 32 MILLS SHOWS

Lukenweld Drier Rolls are at work with every type of paper

High pressures safely employed with Lukenweld Drier Rolls can be used to boost surface temperatures. "What does that mean when we're working with thinner papers?" millmen have asked. The answer is, Lukenweld Drier Rolls are being successfully used in producing every type of paper listed here. And their users come back for more, time after time.

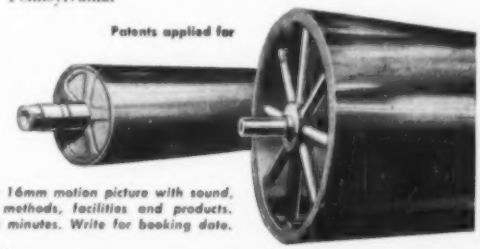
Lukenweld Jacketed Steel Drier Rolls help speed up production—positive scavenging of steam passages flushes out air and condensate, assuring high efficiency. Product quality is higher because surface temperatures are more uniform and constant. Simple in construction, there's nothing to get out of order; can be designed without bolts, nuts or siphons to work loose in service.

In Chemical, Drug, Food and Plastics work, too

Lukenweld Drier Rolls are serving similarly here—crystallizing drugs and chemicals by heating or chilling, drying or freezing foodstuffs. The ability to transfer heat quickly and evenly provides the same economic advantages to these industries.

If your drying problem can be solved by drier rolls, let our engineers help you select the Lukenweld Rolls to handle it: any diameter, 24 inches or 18 feet—lengths to suit each task—plain steel, polished or plated surfaces, or any of the Lukens corrosion-resistant clad steels. Write Lukenweld, Division of Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.

Patents applied for



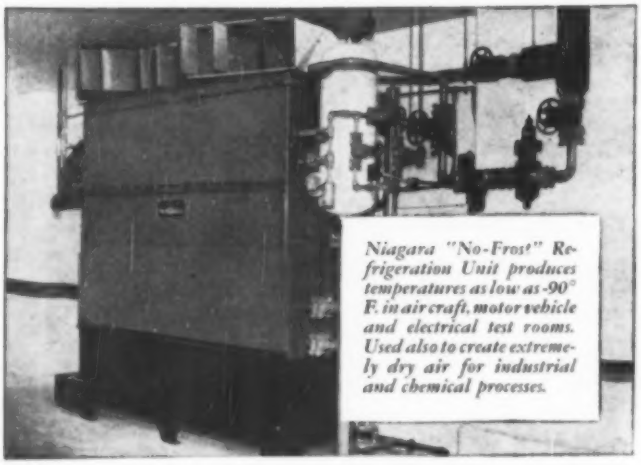
"LUKENWELD", a 16mm motion picture with sound, highlighting our methods, facilities and products. Running time: 20 minutes. Write for booking date.

LUKENS
LUKENWELD DIVISION

DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

INCREASED PRODUCTION AND A MORE UNIFORM PRODUCT WITH A *Controlled Atmosphere*



Niagara "No-Frost" Refrigeration Unit produces temperatures as low as -90° F. in air craft, motor vehicle and electrical test rooms. Used also to create extremely dry air for industrial and chemical processes.

● A controlled atmosphere may be a particular gas, inert or reactive, or it may be air under controlled conditions of purity, temperature or moisture content. Its purpose is to further production or prevent loss of material or product, or to make a uniform and better product.

This Company has worked for many years among such problems and has developed special apparatus that has helped many industrial leaders to improve their manufacturing.

Always, there is a problem of moisture and temperature, whether it may be a special gas atmosphere for heat treating, or air under most precise specifications for a process with hygroscopic materials, or a "cold test" room at -90° F.

Niagara Units for industrial air and gas conditioning make it easier for you to find equipment that will produce the conditions you need with both installation and operating economy.

Write for a Niagara Blower Bulletin on a subject which interests you, or for the address of the nearest Niagara Field Engineer.

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering
405 Lexington Ave. Dept. CM New York 17, N. Y.
District Engineers in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING
NIAGARA
HUMIDIFYING • AIR ENGINEERING EQUIPMENT

knowledge of the process which generates the waste. After identifying the source, consideration must be given to changes in the process which could reduce wastes to a minimum. Treatment is the last resort for unavoidable wastes. Chemical engineers play their part in process adaptation, and waste treatment design which is still necessary.

Principal jurisdictional problem faced by chemical engineers is the fact that some states have more than one group interested in administering the law of that state. Special interest points of view frequently include fisheries, water supply, sewage treatment, recreation areas, and so forth. Flexibility of legal requirements in the various states, and harmony among the several states interested in a single drainage area, are most important.

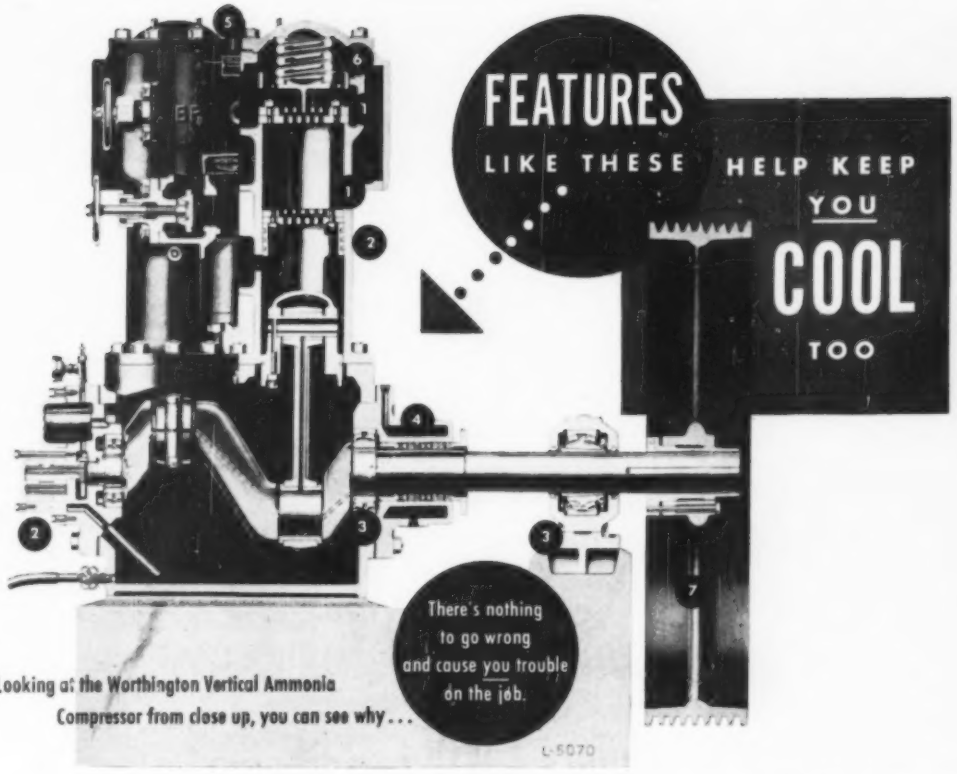
Outstanding in the chemical industry is the sanction and encouragement of management to keep stream pollution at a minimum. Advisory committees which include responsible executives, competent technical advisors to deal with the major problems, and active task groups working on specific problems were described by Mr. Cox. In the long run, the public pays the cost of stream pollution and its control, whether by taxes or high maintenance costs or in the price of goods purchased from companies which must necessarily include pollution prevention costs in the manufacturing. Constructive soil conservation and land management policies in addition to well administered state laws are also needed.

Federal contributions to the combatting of stream pollution were outlined by L. D. Dworsky of U. S. Public Health Service. Basically, Public Law 845 (enacted June 30, 1948) brings for the first time coordinated survey aid and enforcement functions of the federal government.

Public Health Service Changes Engineering Set Up

REORGANIZATION of engineering activities of the Public Health Service, Federal Security Agency, was announced last month by Surgeon General Leonard A. Scheele. The former sanitary engineering division has been replaced by a division of sanitation and a division of water pollution control. Both of these divisions will be under the supervision of Assistant Surgeon General Mark D. Hollis, chief sanitary engineering officer of the Public Health Service, and former chief of the sanitary engineering division.

Dr. Scheele also announced the following appointments: senior sanitary engineer M. Allen Pond as assistant


FEATURES
LIKE THESE HELP KEEP
YOU
COOL
TOO
There's nothing to go wrong and cause you trouble on the job.
Looking at the Worthington Vertical Ammonia Compressor from close up, you can see why . . .
L-5070

The exclusive large-area Worthington Feather* Valve (1)—on both suction and discharge—is the simplest, most durable valve ever made. It consists of flexible ribbon steel strips which seat lightly on ground-face, slotted seats.

Larger sizes have full force-feed lubrication (2) of all running gear; smaller sizes have ample splash lubrication, with self-priming oil pumps and renewable-cartridge filter.

Main and outboard bearings are self-aligning, double-row roller type (3).

The shaft stuffing box (4) is water-jacketed and is extra deep to take the lantern gland and an ample number of packing rings. Oil under pressure is circulated through the gland.

The unit-type manifold (5) has improved quick-opening relief valve. Safety head (6) with ground joint reduces slop-over hazard.

The Worthington Multi-V-Drive (7) includes the easy-on, easy-off, always-tight QD Sheave.

Write us for Bulletin C-1100-B18B giving complete information. *Worthington Pump and Machinery Corporation, Harrison, N. J. Specialists in air conditioning and refrigeration for more than 50 years.*

Part of a balanced system for greater efficiency

The *balanced design* of the Worthington Vertical Ammonia Compressor is duplicated, on a larger scale, in Worthington *systems* for refrigeration and air conditioning.

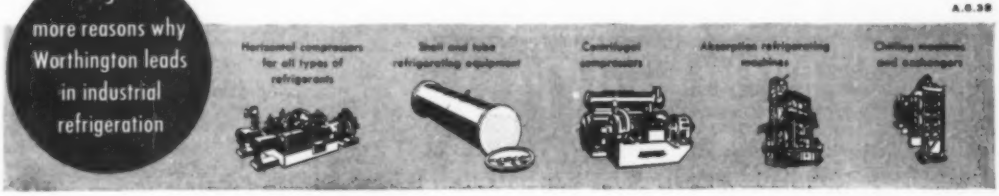
Worthington *manufactures all* the vital "innards"—compressors, condensers, engines, turbines, pumps. The result is a completely *integrated* system—for more efficient, more economical operation.

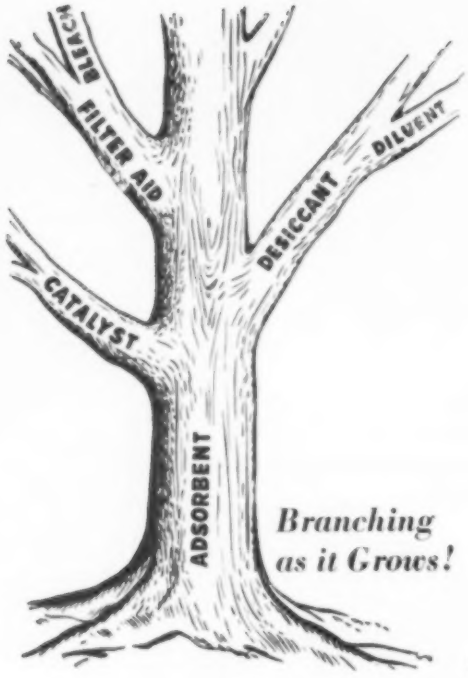
That's why *there's more worth in Worthington.* See your nearby Worthington distributor—in the Classified Telephone Book.

*Reg. U. S. Pat. Off.

WORTHINGTON

A-0.38


5 more reasons why Worthington leads in industrial refrigeration
Horizontal compressors for all types of refrigerants
Shell and tube refrigerating equipment
Centrifugal compressors
Absorption refrigerating machines
Chilling receivers and accessories



FLORIDIN Fullers Earth

introduced by the Floridin Company almost a half-century ago as a superior adsorbent for removing tars, gums, color bodies, etc., from petroleum oils .....

Has gradually extended its usefulness to the benefit of various industries.

The Floridin catalog now offers more than a score of different products of Fullers Earth and Activated Bauxite for the requirements of ....

Oil Refining	Pipe Line Drying
Desulfurization	Polymerization
Dehydrogenation	Treatment of Waste
Solvent Reclamation	Selective Catalysis

Water Treatment
Formulation of Insecticides and Fungicides

Specify —

FLORIDIN
Fullers Earth - Activated Bauxite
PRODUCTS

FLORIDIN COMPANY
ADSORBENTS

Dept. A, 220 Liberty St., Warren, Pa.

chief of engineering activities; sanitary engineer director Carl E. Schwob as chief, division of water pollution control; and sanitary engineer director Callis H. Atkins as chief, division of sanitation.

The division of sanitation has assumed all responsibilities of the former sanitary engineering division except water pollution control and research in environmental sanitation. Expansion of the former water pollution section of the sanitary engineering division into a new division results from enactment by the 80th Congress of Public Law 845, (the Water Pollution Control Act of 1948).

Wyoming Gets Second Unit For Sulphur Recovery

ELK BASIN oil field is Wyoming's largest and has succeeded Salt Creek as the state's most productive. Unlike most fields, however, not enough natural gas is produced to re-pressure producing horizons. In addition, the field's gas contains about 20 percent hydrogen sulphide.

Since late 1947 engineers of Stanolind Oil & Gas Co. have been working on an extraction plant which will solve all problems. When finished next April it will have a feed gas capacity of 12,000 M cu. ft. daily. From this will be produced some 17,000 gal. of gasoline and 39,000 gal. of liquid butane and propane. Extracted H_2S will be processed into 70 long tons of sulphur. In order to re-pressure the field adequately, natural gas will be burned with air to give a ten fold increase in gas volume.

North Carolina Engineering Courses Approved by Council

THE Engineers' Council for Professional Development, the national accreditation agency for engineering colleges and universities, has approved the professional courses in seven fields of study in the school of engineering at N. C. State College.

The council's action in accrediting the seven departments, including three departments which had never been on the top list before, places the college's school of engineering on a national academic ranking with the largest engineering institutions in the United States.

Previously, the school of engineering at State College had four accredited departments. They are the departments of ceramic, civil, electrical, and mechanical engineering.

In addition to its approval of these same departments, the council also accredited the aeronautical option in

ACIDITY AVAILABLE
Davison Free Flowing Silicofluorides Offer a Tool for Many Industries
A few typical examples utilizing the acid and fluoride properties of Davison silicofluorides include their use as an anti-fermentive and as a disinfectant for copper, brass, or wooden vessels in breweries; as a laundry sour direct or in special formulae; as a concrete hardening and waterproofing agent by neutralization; as a mothproofing and dye fixing agent; and many other neutralizing and fixing as well as polymerizing and fluxing operations.
If your manufacturing processes require this acidic property of the silicofluorides or components, you are invited to consult Davison.
THE DAVISON CHEMICAL CORPORATION
BALTIMORE-3, MD.
Progress Through Chemistry
PRIMARY PRODUCERS OF SILICOFLUORIDES
METALLIC AND FLUORIDE IONS
USEFUL AVAILABLE COMPONENTS
Davison Silicofluorides also provide a source of conveniently available metallic and fluoride ions. These components are widely utilized in alloying and refining aluminum, in casting magnesium and as an anti-fermentive and mothproofing agent.

A manufacturer requiring good limestone has only to look at Oklahoma - - and he will find what he needs. For limestones are widely distributed over the entire state.

In the Arbuckle Mountains, limestone deposits have a combined thickness of about 8,000 feet (if the dolomites are included). Physically, Oklahoma limestones range from friable or chalky to stone with maximum crushing strength; from coarsely crystalline to very fine-grained; and from minutely oolitic to coarsely pisolitic. Chemically, they range from impure stone suitable for woolrock to chemical grade.

Oklahoma limestone is being utilized extensively for many purposes. Its quality and availability merit consideration for a multitude of additional uses.

TYPICAL ANALYSIS
(26 feet)

	Percent
CaO	54.760
MgO	0.680
SiO_2	0.143
Fe_2O_3	0.074
Al_2O_3	0.174
P_2O_5	0.007
SO_3	0.008
Ignition loss	42.940
Total	99.786

Detailed information on Oklahoma's mineral resources is available on request, based on data by the Oklahoma Geological Survey. Map showing location of mineral deposits is also available.

mechanical engineering, the industrial engineering, and the chemical engineering curricula.

Trend to Natural Gas Grows in Industries

NATURAL gas will, in two or three years, be available in practically all the large centers of industry in the United States, according to Paul R. Taylor, vice president of Stone & Webster Service Corp., who addressed engineers attending the 69th Annual Meeting of the American Society of Mechanical Engineers in New York last month. He told a process industries and fuels session that in comparison with present-day costs of solid and liquid fuels, natural gas can be purchased for industrial purposes at a cost considerably less than it is necessary to pay for these competitive products.

"Costs for natural gas should remain comparatively stable," Mr. Taylor stated, "because the earnings and rates of natural gas companies are controlled either by Federal or State Commissions.

"In addition to the savings in actual cost of natural gas, further savings are achieved by both the distributor and the ultimate industrial consumer because of less labor required for the unloading and storage of solid and liquid fuel and for the disposal of ashes resulting from the use of solid fuel."

He pointed out that natural gas, being of constant heating value, specific gravity and burning characteristics, is ideal for use in any type of industry where heat is required. It is especially desirable for industrial uses where close temperature control, cleanliness and freedom from injurious ingredients are required, he said.

CMRA and Brooklyn Poly To Hold Joint Meeting

TO PRESENT the chemical markets field to technically trained students in the metropolitan New York area, the Polytechnic Institute of Brooklyn and the Chemical Market Research Association will sponsor a joint all day meeting at the Hotel Biltmore, Feb. 10, 1949.

Through the cooperation between the institute and the association, the meeting will provide an opportunity for students with chemistry and chemical engineering educations to find out about the rapidly developing outlets in this new division of the chemical industries.

Chemical market research is one of the fields where there is a growing recognition of the need for trained men. In addition to students in colleges in

R-S valvEvents

ISSUED PERIODICALLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH FLOW CONTROL AND SHUT-OFF

Lots of Folks Can Make a Valve . . . .

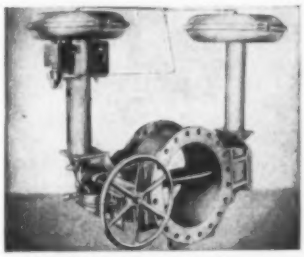
Many machinists can make a valve. They don't even have to be very good machinists, nor have very good equipment because it probably won't be a very good valve anyway. In any event it will lack the engineering a valve requires if it is to stand up and deliver the service.

Big businesses with big shops often succeed in building a valve which will give service but they pay a fabulous price to do it, though the cost is often hidden in "shop overhead." Various people concerned believe they have saved money but accurate cost-accounting would prove this not to be the case.

We recently saw a large valve built in the company shop by a manufacturer (not in the valve business) who boasted of a cost of only about $4,000. We couldn't have built the job in our own shop, specializing in valve construction, for less than $7,000, before figuring our modest profit. We know darned well no amateur valve-builder could build it for $4,000 either!

The days of the slap-happy stove-pipe damper masquerading as a valve are gone, and R-S Products with its rigid engineering standards has done much to banish them.

R-S Control and Shut-off Valves are as carefully engineered as a bridge or a building and there are just about as many stresses to figure to build a valve which will give full service with full safety factor, without waste of material or labor.



R-S Valve Type 706, 24 inch, 125 pound, with two diaphragm motors

For Regulating Downstream Pressure

R-S Valve, Type No. 706, shown at top of next column, is a 24-inch 125-pound valve with two diaphragm motors, single valve-positioner and single pressure controller. Designed for regulation of downstream pressure. The vane opens with air failure. 80-pound pressure-drop across the valve demands the use of two diaphragm tops to get the needed power.

Let's Get This Straight

Cast iron valves do not thrive in a temperature of 1400° F. Nevertheless, people ask for them occasionally. Russell Ayers, Sales Manager of R-S Valve Division, had another such inquiry recently, as reported to the Editor of ValvEvents.

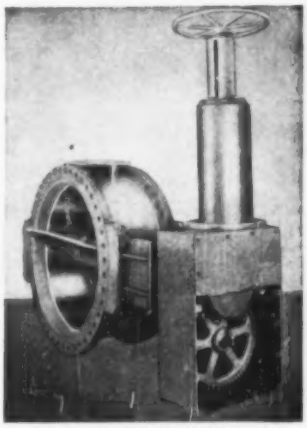
At 1400° F. a cast iron valve has long since lost all interest in flow control, not to mention shut-off.

Here's a brief rough guide on what various metals will take in the way of temperature:

Material	Elevated Temperature Limit
Cast Iron	450 deg. F.
R-S "H" Metal	1000 deg. F.
Carbon Steel	750 deg. F.
Carbon Moly Steel (½% Moly)	950 deg. F.
Chrome Moly Steel (4-6% Chrome ½% Moly)	1250 deg. F.
18-8 Stainless Steel	950 deg. F.
Chrome Nickel Alloy Steel (other than 18-8)	1250 deg. F. up to 2000 deg. F.

There are other factors just as important in the design of a valve as temperature. Therefore, we say the above is only a rough guide.

It is a good idea in addressing inquiries to us on valves to follow the list of working conditions on the inside back cover of R-S Catalog #17. If you haven't one, you'd better tell us and we'll send it.



R-S Valve Type 710, 48 inch, 125 pound, with renewable bronze liner

R-S Valve in High Head Water Service

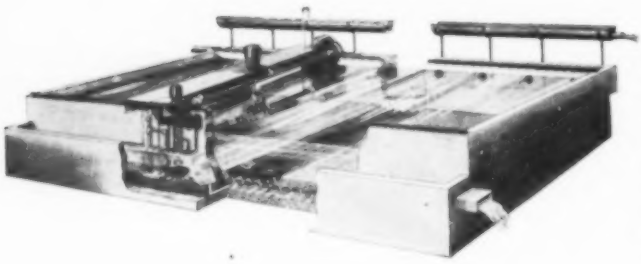
Picture shows R-S Type No. 710. It is a 48-inch 125-pound cast iron valve with renewable bronze liner. This valve was built for water service and is now operating in a western dam under high pressure. The handwheel control has a gear reduction drive so that only 50 pounds of force is required of the operator to handle the valve even under highest pressure conditions.

The New R-S Valve Catalog #17

R-S Valve Catalog #17 is packed with information for engineers. There are over 70 halftone pictures of R-S Valves . . . working drawings of 21 types of R-S Valves with standard controls and fittings and complete dimensional data for all sizes . . . working drawings of 22 types of prime movers . . . numerous other diagrams, graphs and miscellaneous drawings. Address R-S Products Corporation, Valve Division, Philadelphia 44, Pa.

JHLee 41

A FILTER which cleans itself

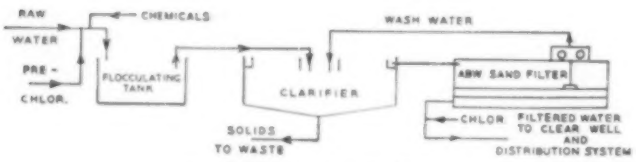


The Hardinge Automatic Backwash Rapid Sand Filter

Here is a sand filter which cleans itself—automatically—with no interruption whatever to the filtering operation. No shut-down or change-over is necessary while cleaning is in progress. Capacities range from 100 gallons per minute to 3000 gallons per minute.

The secret lies in its special, compartmented filter bed and traveling backwash mechanism which automatically cleans and removes the sludge from one compartment at a time—on a pre-determined time cycle or with increase in head pressure.

Can also be used in filtering waste water for return to the process. Write for Bulletin 46-11.



Typical water supply layout

HARDINGE

COMPANY INCORPORATED

YORK, PENNSYLVANIA — 240 Arch St. • Main Office and Works
NEW YORK 17—122 E. 42nd St. • 205 W. Wacker Drive—CHICAGO
SAN FRANCISCO 11—24 California St. • 200 Bay St.—TORONTO

the metropolitan area who are taking their degrees in chemistry and chemical engineering, faculty members from these departments and representatives of industry will attend the meeting.

Lawrence Flett, director of the new products division, National Aniline Division of the Allied Chemical and Dye Co., is serving as chairman of the joint committee for the meeting.

Rust Will Build Petrol's New Texas Units

PETROL REFINING CO. has engaged Rust Engineering Co., Pittsburgh, Pa., to design and erect two crude oil topping units at Petrol's refinery at Texas City, Tex. They will have a combined capacity of 50,000 bbl. per day of crude. The units will include formerly government-owned azeotropic distillation equipment erected in the Magnolia Petroleum Co. refinery at Beaumont, Tex., during the war to recover toluene from gasoline. Petrol has bought the equipment from War Assets and will operate the topping units in conjunction with a Houdry catalytic cracking unit.

Direct Ammonia Use Pushed by Shell

DIRECT application of ammonia to the soil is being systematically developed by Shell Chemical Corp. on a substantial scale. New commercial equipment is being demonstrated and results are currently available through an address of a company spokesman at the November meeting of National Fertilizer Association. One of the problems being solved to permit expansion of the agricultural development, is the necessary improvement in methods for safe handling of liquid ammonia under pressure.

CORRECTIONS

New Xylidine Process

IN THE October issue of *Chemical Engineering* (p. 126) a line was omitted. At the top of the first column insert: Each catalyst bed, 8 ft. diameter by 30 . . .

Industrial Notes

IN THE December issue of *Chemical Engineering* (p. 254) it was incorrectly reported that Harry P. Smith was made vice president and director of sales for Mathieson Chemical Corp. Mr. Smith was made assistant general sales manager. The announcement was made by E. E. Routh who is vice president and director of sales.

BALANCED STRENGTH
gives better
Multiwall Performance

BALANCED STRENGTH of Bemis Multiwall Paper Shipping Sacks is the result of control of paper quality plus careful manufacturing methods. Always specify Bemis Multiwalls for chemicals.

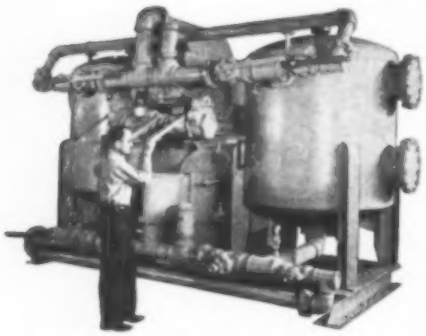
BEMIS
"America's No. 1 Bag Maker"

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala. • Houston, Texas
San Francisco, Calif. • Vancouver, Wash. • Wilmington, Calif.
Baltimore • Boise • Boston • Brooklyn • Buffalo • Charlotte
Chicago • Cleveland • Denver • Detroit • Jacksonville, Fla.
Indianapolis • Kansas City • Los Angeles • Louisville • Memphis
Minneapolis • New Orleans • New York City • Oklahoma City
Norfolk • Omaha • Phoenix • Pittsburgh • St. Louis • Salina
Salt Lake City • Seattle • Wichita

2 Years' Savings Paid for this Kemp Dryer

The savings were chemicals previously lost in a single process in this plant!

The Kemp Dryer installation dissipated the vapor-cloud and enabled the operator to see the bottom of a synthetic fibre solution tank, and draw off the full safe amount of the viscous material.



The capacity of this Kemp Dynamic Dryer is 1425 scfm. Air enters at 85° F., saturated, and is continuously dried to a dew-point of 0° F.

Previously, the tank could be but partly drained, and the remainder then drawn off as waste

Then too, all air-operated instruments worked better than ever before and there have been reductions in maintenance and labor.

Operation is virtually automatic, requiring brief attention only when the twin towers are alternately reversed from adsorbing to reactivating cycles.

Kemp Dryers are available in a wide variety of sizes and types from portables to giants.

If it must be DRY . . . remember KEMP. But first, perhaps you'd like to talk with a qualified Kemp engineer — there's one not far from you — or see the Kemp Catalog 25-D.

The C. M. KEMP MANUFACTURING CO.
405 East Oliver Street, Baltimore 2, Maryland

☐ Please send me your NEW Catalog 25-D on Kemp Dryers.

☐ Please send a Kemp engineer in to see me.

Name _____

Company _____

Street _____

City _____ Zone _____

State _____

ACE-1

PRECISION CARBURETORS. BURNERS FOR INDUSTRIAL HEAT CONTROL. FIRE-CHECKS AND OTHER SAFETY DEVICES. ATMOSPHERE GENERATORS. INERT GAS PRODUCERS. ADSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL.

KEMP of BALTIMORE

NEWS FROM ABROAD

Special Correspondence

Tasmania has aluminum problem . . . New steel firm in Italy . . . Canada gets more sulphuric . . . Brazil plans new refinery . . . Isotopes for Canadian firms

Aluminum Project To Be Revised

HOBART—The 10,000-ton-a-year aluminum refining project now being developed by the Tasmanian Government with the assistance of the Dorr Co., New York, may be revised to accept proposals by the British Aluminum Co.

The English concern is willing to set up a 100,000-ton-a-year plant. Main feature of the new plan is the abandonment of reliance on Australia's scant bauxite and hydroelectric resources and the development of bauxite deposits in the Solomon Islands, with a possible hydroelectric power system in New Guinea.

The proposal is said to have been sponsored by the British Government to develop a supply source for aluminum outside the dollar area.

The State Government of Tasmania is loath to withdraw from the original plan unless the final processing is to take place in the island, because a hydroelectric power station for the refining of alumina is already under construction.

British Monsanto Expands Its Silicon Interest

LONDON — Interest of Monsanto Chemicals Ltd. in the silicon chemistry field is expanding. E. A. O'Neal, Jr., managing director of the British affiliate of the American chemical company, announced in November that Monsanto Chemicals Ltd. had acquired Silicon (Organic) Developments Ltd.

Activities of Silicon (Organic) Developments Ltd. have been noteworthy for development work on modified forms of silicate esters. In particular, ethyl silicate has proved to be of especial value in precision casting. Its use as a bonding agent in the refractory employed in casting turbine blades for jet propulsion power units is of the greatest importance at the present time.

Registered offices of Silicon (Organic) Developments Ltd. will now be at 8 Waterloo Place, London, S.W. 1, headquarters also of Monsanto. Sales office will be in Victoria Station House, Victoria Street, London, S.W. 1. Works of Silicon Developments are at Bridgend, Glam.

Steel Firm Formed by Italo-American Interests

TURIN—An agreement has been signed here between representatives of a group of Turin manufacturers and representatives of the Vanadium Steel Co. for setting up an Italian company, Vanadium Alloys Steel Co., Soc. It. p. az. This will be one of the first private American business undertakings started in Italy under the Marshall Plan.

On the Board of Directors of the new Italo-American company will sit the directors of the American company, Messrs Roy Carnegie McKenna, Gill and Elkann, the president, vice president, and manager of the export department of the Vanadium Co. Italians are represented on the board by Sig. Alfredo Zerboni as vice president and managing directors, and Vittorio Ovazza and Umberto De Benedetti, directors; the latter will also be general manager.

The idea of setting up a new company, which would facilitate the rapid importation into Italy of large quantities of special steels with which this country has always been inadequately supplied, occurred to Mr. McKenna during a recent visit he paid to Italy.

The Italian vanadium company reportedly intends, first off, to make available to small and average sized concerns those raw materials that American steel companies are already supplying to the large Italian factories. The possibilities of turning out finished steel products at a later date also are being explored.

Canadian Industries Makes Sulphuric at Hamilton

OTTAWA—Canadian Industries Ltd. newly-opened sulphuric acid plant at Hamilton, Ont., has started operations and it is expected to produce approximately 250 tons of acid daily, increasing as a result the Canadian annual production by about 30,000 tons and help to supply the greater demands for sulphuric acid in such industries as steel, paints, newsprint, textiles, plastics, fertilizers, and adhesives as well as in the production of radium.

Steam generated in processing the sulphur will provide the heat required in the manufacture process and for the small adjacent building. Most of the plant equipment is outdoors and it is almost a "buildingless" operation. The plant was constructed by Pigott Construction Co., Hamilton, Ont., and supervised by I. R. Tait, chief engineer for Canadian Industries Ltd., with A. N. Campbell of Hamilton being resident engineer. The estimated cost of this new plant is reported at $1,250,000.

Pakistan Gets Plastics Industry

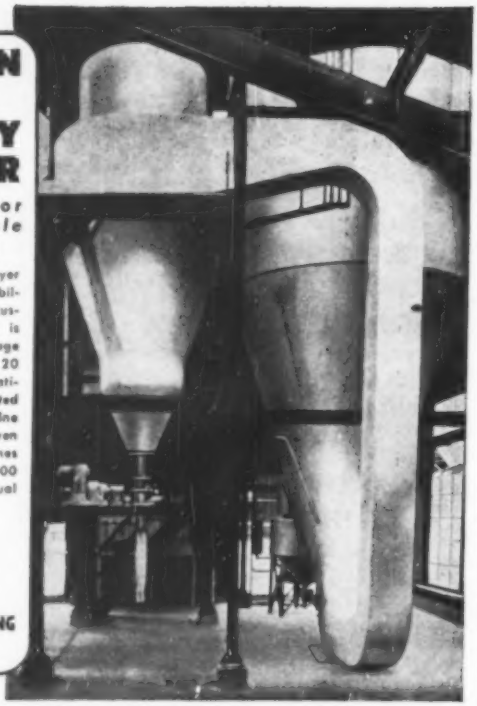
KARACHI—Establishment of the first plastics industry in the dominion of Pakistan will be scored to the credit of an Australian company—Plastics Amalgamated Ltd., of Sydney.

The company is to supply machinery and know-how for a new company backed by Pakistani capital. Under the dominion's policy of encouraging in-

BOWEN No. 4 SPRAY DRYER

...new unit for moderate scale production

This compact Spray Dryer has the operating flexibility found in Bowen custom-made dryers, yet is available as a package unit. Production is 5 to 20 tons per day—automatically controlled. Patented Bowen atomizers for fine or coarse particles, driven by Bowen Spray Machines with speed range of 6,000 to 20,000 rpm. Factual data available.

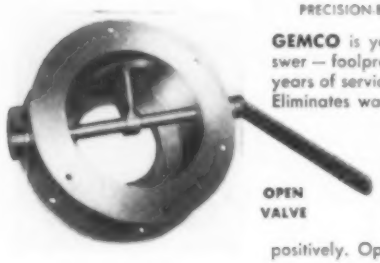


BOWEN ENGINEERING INC.
Garwood 1, N. J.

GEMCO SPHERICAL DUST-TITE VALVES

Assure Improved Plant Methods on
BINS, HOPPERS, BLENDERS, PIPELINES

PRECISION BUILT FOR *Your* JOB!



OPEN VALVE

GEMCO is your once-for-all-time answer — foolproof, efficient, built for years of service. Saves time and labor. Eliminates waste and troubles of old-style slide gate valves.

• The sharp disc cleans the seat and prepares it for smooth, quick, continuous action. Quarter-turn opens full or closes positively. Openings from 2" to 16".

Made, as per requirements, in cast iron, aluminum, stainless steel, monel, everdur, copper, or bronze.

For dry powders, crystals and pasty materials. NO STICKING, NO SIFTING, NO DUSTING.

WRITE US FOR ACTION!

General Machine Company of New Jersey
Established 1916
SPECIAL CHEMICAL AND MIXING MACHINERY • SPHERICAL VALVES
400 MARKET STREET • NEWARK 5, N. J.

dustries the company will be exempt from income taxes until it gets fully under way.

Brazil Plans Refinery For Domestic Crude

RIO DE JANIERO—Federal government has been empowered to make an appropriation of $1,375,000 in favor of the National Petroleum Council to meet expenditures in connection with the formation of the "Refinaria Nacional de Petroleo S. A." and of the building of a refinery in the State of Bahia for treating Brazilian oil. When the company has been duly constituted, it will repay the above sum by handing over to the government 25,000 shares of the nominal value of $55 each, that is 50 percent of the company's total capital, the proportion to be subscribed by the Union. On the other hand, the National Petroleum Council is authorized to borrow up to $1,375,000 from the Bank of Brazil, representing the amount which will be offered for public subscription. Two contracts were signed between the Refinaria Nacional de Petroleo S. A. and the M. W. Kellogg Co. and Kellogg Pan American Corp., respectively. Under the first contract M. W. Kellogg Co. undertakes to draw up plans and supply all the equipment for a refinery at Bahia to handle 2,500 bbl. of oil per day. The second contract provides for the actual construction of the refinery by Kellogg Pan American Corp. The total contract price is $2,000,000, and the refinery should be in operation some time in 1949, according to *Brazil Trade Journal*.

Australia Develops Heat Resisting Paint

MELBOURNE—Paints that resist temperatures of 1,000 deg. F. have been developed by the Council for Scientific and Industrial Research.

Basis of the new paints is butyl titanate, produced from rutile and ilmenite, major components of Australia's "black sand" beach deposits.

Tested on the inside of the main flue stack of a boiler plant, butyl titanate paint effectively checked corrosion which normally removed 1 oz. of steel per sq. ft. every six weeks. After 32 weeks under these extreme conditions the paint coating was little affected while test samples of ordinary paints had entirely disappeared.

In addition to its heat-resistant properties, the new paint provides superior protection against salt water corrosion. Preliminary tests indicate that ships will require repainting far less frequently, and as the new paint is not

Another Atlas "First"

The HLB System...

of Selecting Emulsifiers

as Easy as One-Two-Three!

The new Atlas HLB System helps you make quick work of choosing the right emulsifier for *your* job. The system is based on empirical numbers representing the Hydrophile-Lipophile Balance of each emulsifier. Through its use, you can frequently eliminate needless, tedious experiments to determine which of hundreds of emulsifiers to use in your product.

For example: You want to make an O/W emulsion of paraffin. Under the new Atlas system, it's fast and easy. Just three steps:

One! You consult the table on page 21 of the Atlas Surface Active Agents book. You find that the Surface Active Agents used are:

Span 40—Tween 40 Combined
Span 80—Tween 80 Combined
Or other palmitates, stearates, or oleates. *The most favorable HLB: 9-12.*

The HLB of a 50-50 mixture of Span 40 and Tween 40 would be figured like this:

	HLB		*Proportion*	
Span 40	6.7	x	50%	3.35
Tween 40	15.6	x	50%	7.8
				11.15

Such a mixture is obviously within the favorable range. In the same manner you would find that an 80-20 or 20-80 mixture falls outside the optimum HLB range of 9-12.

Two! You try a series of five preliminary emulsions, using five different ratios of Span 40 to Tween 40 (palmitates). This might be repeated with Span and Tween 60 (stearates); and Span and Tween 80 (oleates). Thus you simply, systematically find the best fatty acid derivation—and the optimum HLB—for *your* job.

Three! You consult the big pull-out insert in the Atlas book which shows at a glance the wide list of Atlas products in the fatty acid class you want, with HLB numbers, solubilities, viscosities, and other general characteristics that relate to your problem. As guides, actual formulas for making emulsions are shown.

The new Atlas HLB System—the first of its kind—is described in detail in Chapter 2 of the Atlas Surface Active Agents book. Other features of this publication include chapters on Surface Active Agents in the manufacture of polishes, paints, cutting oils, insecticides, detergents, and textiles. Seventy formulas for various products make the book a handy reference guide. *Write for your copy on your official stationery.*

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

In Canada address A. F. Sterne and Sons LIMITED *Brantford, Ontario*

AN AMAZING LUBRICANT

LUBRIPLATE 130-AA

Protects Against Rust and Corrosion

A super grease type lubricant! A marvelous anti-seize compound and a real protector against rust and corrosion. From the standpoint of general utility and diversity of important uses, LUBRIPLATE 130-AA is unequalled. While it is ideal for the heaviest loads, this remarkable lubricant does not cause drag and actually conserves power. Write for a free copy of the LUBRIPLATE Service Hand Book.

LUBRIPLATE DIVISION
FISKE BROS. REFINING COMPANY
Newark 5, N. J. • Toledo 5, Ohio

DEALERS FROM COAST TO COAST - *See Your Local Classified Telephone Book*

FLOATLESS
MAINTENANCE-FREE
LEVEL CONTROL
UNLIMITED LIFE
No Moving Parts to Wear Out.
SAFETY
Low Voltage in the Probe Circuit.
MAINTENANCE-FREE
No Vacuum Tubes.
SIMPLICITY
No Floats, Seals, or Moving Elements.
OPERATION
Two probe rods reach into the tank to the levels where pump-on and pump-off operations are required. Actual contact of the probes with the liquid operates Photoswitch Control which makes and breaks the pump-control circuit.

PHOTOSWITCH Level Controls, effective for all conductive liquids, are available for single-level indication or control, on and off pump control, and boiler feedwater control.

Write today for Level Control Bulletin PF479.

PHOTOSWITCH INCORPORATED
PHOTO-ELECTRIC & ELECTRONIC CONTROLS FOR EVERY INDUSTRIAL PURPOSE
CAMBRIDGE, MASS. · *District Offices IN ALL PRINCIPAL CITIES*

inflammable, fire risks will be greatly decreased.

Butyl titanate can be added to ordinary linseed oil paints to provide resistance to chalking and weathering. It can also be used to impart a matt surface finish to nitrocellulose lacquers.

Its insulating properties are said to be equal to the best transformer oils. Allied titanium derivatives make possible the development of a wide range of plastics with heat-resistant properties, according to a spokesman of the Council for Scientific and Industrial Research.

Poland Plans to Make Its Rayon by Nelson Process

LONDON—Poland joins China in the ranks of purchasers of the Nelson process for continuous spinning of rayon. The *Chemical Trade Journal* reports that after lengthy negotiations between the Polish Purchasing Mission in London, acting on behalf of Textile Import Bureau, Lodz, Poland, and Dobson and Barlow, Bolton, a contract has now been signed to the value of $1,000,000 for the supply of Nelson continuous spinning plant, to produce 2.5 tons per day of continuous filament rayon yarn. Delivery is to commence almost immediately. The agreement, which envisages further considerable projects for additional plants and machines, was concluded only after thorough investigation of other continuous rayon spinning systems.

Uranium Corp. Formed in British Columbia

VANCOUVER—Uranium Corp. of B. C. Ltd., was recently incorporated at Victoria, B. C. It is capitalized at 100 no par value shares and is a private company headed by Captain A. M. Hubbard, of Uranium Chemicals Co., a U. S. concern.

Both U. S. and local groups are reportedly interested in the new company, which is said to have working agreements with Pacific Uranium Syndicate, finders of the original Bridge River uranium deposits some months ago.

Anzac Sugar Firm Plans More Byproducts

SYDNEY—Colonial Sugar Refining Co. Ltd., which refines more than a million tons of Australian and Fiji sugar annually, has launched out on an extensive program of byproducts development.

CSR teamed up some years ago with

Why the Big Swing

–TO *SOLVENT* EXTRACTION IN SOYBEAN MILLS?

Answer: The continuous solvent extraction system produces 4 to 7 per cent *more* vegetable oil . . . as proven by the Allis-Chalmers system when checked against the screw press and hydraulic methods.

Mill operators get greater profit right from the start. And *complete* plant cost recovery can be obtained within a few short years.

That's why the West Tennessee Soya Mill (illustrated here) and numerous other mills are swinging to *Allis-Chalmers* installations.

CALL ON ALLIS-CHALMERS FOR 2-WAY AID

Allis-Chalmers gives you 2-way aid for better solvent extraction of vegetable oils. You get *individual process engineering* — including specifications, diagrams, flow sheets, and all necessary machinery layout drawings. And you get *complete plant equipment* — not only preparation and extraction equipment, but also power and electrical machinery . . . correlated to give you an *efficient* plant layout. It will pay you to *call on Allis-Chalmers* for help in solving your solvent extraction problems. Use handy coupon below, or contact our nearby office.

ALLIS-CHALMERS, 1147A SO. 70 ST.
MILWAUKEE, WIS.

- ☐ Please send bulletin 1386757.
- ☐ Am interested in information on solvent extraction of _____
- ☐ Would like to have A-C representative call.

Name _____

Firm _____

Address _____

City _____ State _____

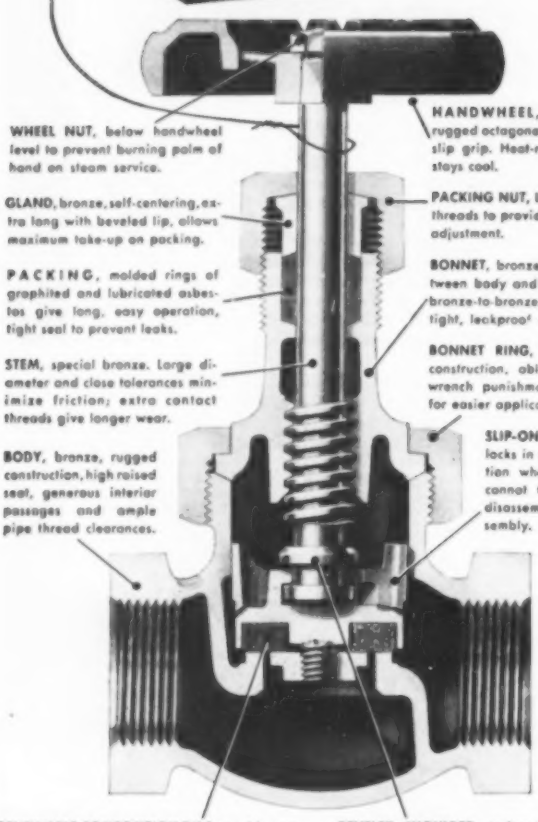
A 2592

ALLIS-CHALMERS

Pioneers in the Field of Continuous Solvent Extraction

Here's WHAT makes this KENNEDY VALVE Better . . . . and WHY!

KENNEDY HEAVY BRONZE GLOBE VALVE (FIG. 89) recommended for services up to 150 pounds steam or 250 pounds water, oil, air or gas. ¼" to 3" sizes available.



WHEEL NUT, below handwheel level to prevent burning palm of hand on steam service.

GLAND, bronze, self-centering, extra long with beveled lip, allows maximum take-up on packing.

PACKING, molded rings of graphited and lubricated asbestos give long, easy operation, tight seal to prevent leaks.

STEM, special bronze. Large diameter and close tolerances minimize friction; extra contact threads give longer wear.

BODY, bronze, rugged construction, high raised seat, generous interior passages and ample pipe thread clearances.

HANDWHEEL, malleable iron, rugged octagonal shape, for non-slip grip. Heat-radiating design stays cool.

PACKING NUT, bronze with long threads to provide extra packing adjustment.

BONNET, bronze, with joint between body and bonnet making bronze-to-bronze true union for tight, leakproof construction.

BONNET RING, bronze, heavy construction, able to withstand wrench punishment. Large flats for easier application of wrench.

SLIP-ON DISC HOLDER, locks in a definite position when wide open, cannot fall off during disassembly and reassembly.

RENEWABLE COMPOSITION DISC, provides perfect seating; asbestos for steam service and special types for various services and temperatures.

BEVELED SHOULDER, makes tight joint with conical seat on underside of bonnet when valve is wide open, for repacking under pressure.

Write for Bulletin No. 36 • **BUY FROM YOUR LOCAL DISTRIBUTOR**

THE **KENNEDY** VALVE MFG. CO.
1064 EAST WATER ST.
ELMIRA, NEW YORK
VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE-WAREHOUSES IN NEW YORK, CHICAGO, SAN FRANCISCO • SALES REPRESENTATIVES IN PRINCIPAL CITIES

British Industrial Solvents Ltd. to establish Australia's first major fermentation industry—Robert Corbett Pty. Ltd., Sydney. This subsidiary is producing acetone and butanol by fermentation of molasses. Butyl acetate, ethyl acetate and amyl acetate form a secondary commercial line. A plant is now going up for the production of acetic acid by fermentation.

A new wholly-owned subsidiary, Colonial Sugar Chemicals Ltd., has been established with a capital stock of £3-million. Half this amount will be spent on a plant at Rhodes, New South Wales, to produce acetic acid, acetic anhydride, cellulose acetate and vitamins B_1 and C. The firm is in consultation with the Badger Co. for engineering advice on some sections of the project.

Acetic acid is expected to be in production late next year at the rate of 3,000 tons a year. Sufficient acetic anhydride capacity will be provided to supply the annual market requirements of 500 tons, plus the company's own requirements in cellulose acetate production.

Although Australian acetic acid production already yields exportable surpluses, it is felt that the time has now come to plan for the requirements of the Australian acetate rayon project of the Courtauld concern. Acetate molding powder will provide a more immediate outlet.

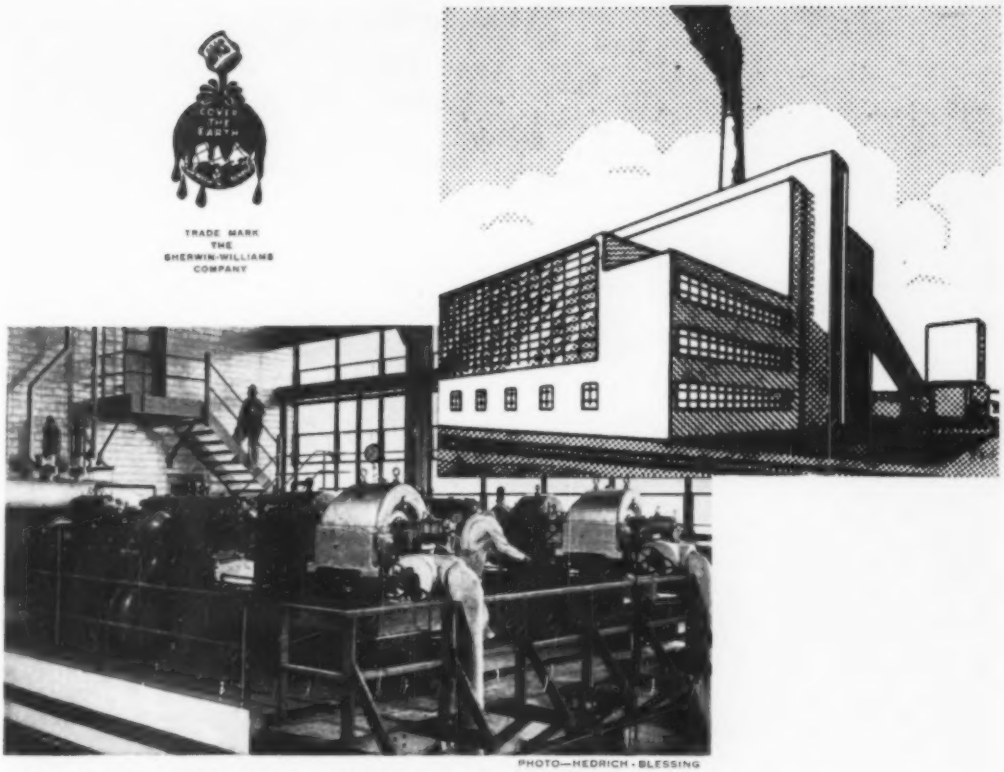
Vitamin C has been in commercial production for several years, but a new, yet undisclosed bulk outlet in the food-processing industry has been developed. Capacity will be expanded and vitamin B_1 will also be synthecized on a large scale.

The synthesis of Vitamin C (ascorbid acid) involves five steps: (1) Glucose is hydrogenated under pressure. Raney nickel catalyst assists this reaction. (2) The resulting sorbitol is oxidized by fermentation with *Acetobacter suboxydans* to sorbose and this is concentrated under vacuum. (3) Diacetone sorbose is produced by condensation with acetone, and with copper sulphate and sulphuric acid as catalysts. (4) Permanganate oxidation of the purified diacetone sorbose yields diacetone ketogulonic acid. (5) Crude ascorbic acid is obtained by hydrolysis, esterification, lactonization and enolization of diacetone ketogulonic acid in a single step. Pure ascorbic acid of 98 to 99 percent is obtained by recrystallization of the crude material.

Propane Gas Production Starts in Canada

VANCOUVER—Propane gas manufacturing has started in Canada for the first time in commercial quantities at

TRADE MARK
THE
SHERWIN-WILLIAMS
COMPANY



PHOTO—HEDRICH-BLESSING

SHERWIN-WILLIAMS INSTALLS FULLER ROTARY COMPRESSORS IN NEW BOILER HOUSE

Long delayed, due to difficulties encountered in obtaining materials and equipment during the war years, the much needed new boiler house of The Sherwin-Williams Company Chicago plant, was put into operation during the early part of 1947. However, this delay permitted further study and adoption of the latest techniques, and several unique dividend-paying features.

Fuller Company is justly proud to have been given the opportunity to supply two "lifetime-efficient" Fuller Rotary Compressors for this most modern and efficient industrial plant. These compressors are of the two-stage type, each having a capacity of 1592 c.f.m., free-air, at 120-lb. pressure, driven by 350 hp. turbines, equipped with speed reducer, to operate at 575 r.p.m. They furnish air for both factory and power house service.

Bulletin C-5, illustrates and describes Fuller Rotary Compressors and Vacuum Pumps. We'll be glad to send you a copy.

FULLER COMPANY, CATASAUQUA, PA.

Chicago 3 - 120 So. LaSalle St.

San Francisco 4 - 420 Chancery Bldg.

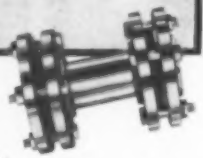
A LIFETIME OF NEW MACHINE EFFICIENCY

FULLER

C-179

Here's
cost-saving news
for users of
rubber-lined pipe

New GACO Joints for Rubber-Lined Pipe
—slash installation and repair costs
—eliminate need for welded fittings



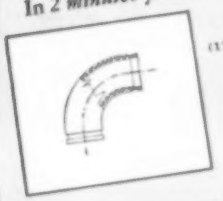
Now, with the GACO Pipe Joints, rubber-lined pipe can be installed and maintained as easily — as economically — as regular unlined types!

Here's why

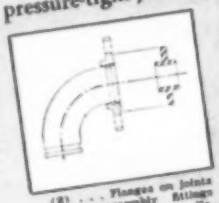
- Costly design engineering is eliminated . . . rubber-lined pipe can be cut and installed by your own crews.
- Joints made in two minutes — **shutdown time cut to a minimum.**
- No welding — layouts are flexible, easily changed . . . free-turning flanges make alignment during installation easy.
- Easily adapted to present rubber-lined pipe systems.
- Large safety factor — tested to 1300 pounds hydrostatic pressure.
- Thoroughly tested in plants where corrosive liquids are handled.
- Shipped complete ready to install.

Little special equipment is needed to install GACO joints — your own pipe machine can be adapted to do the necessary cutting and machining. Or, if you prefer, Gates has special portable machines available on lease or direct sale.

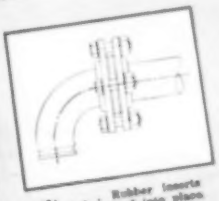
In 2 *minutes* your own crews can make pressure-tight joints



(1) Using either portable equipment or standard pipe machine equipped with adapter, lined pipe sections are cut, grooved and counterbored in a matter of seconds.



(2) . . . Flanges on joints or assembly fittings (45° ells, 90° ells, Tees or, T's) are slipped on and locking rings inserted in slots.



(3) . . . Rubber inserts are slipped into place and flanges bolted together—job completed

GATES ENGINEERING COMPANY

NEW CASTLE AVE., NEW CASTLE, DELAWARE
CHICAGO PLANT, 165 NO. ABERDEEN ST.
CHEMICAL PROOF CONSTRUCTION, INC.
71 Columbia Street, Seattle, Washington

Sales Offices
100 Boylston Street, Boston, Mass.
177 Christopher St., New York, N. Y.
726 Jackson Place, N.W., Washington, D. C.
3730 Main St., Philadelphia, Pa.
POTTER & DUGAN—Buffalo, N. Y.
GOODALL RUBBER COMPANY
Chicago, Ill., Philadelphia, Pa., New York, N. Y.

Get details today
Write for free bulletin

the new $500,000 plant in the Turner Valley of Western Propane Limited.

The Alberta plant is the first in this country constructed solely for the manufacture of propane gas.

Tannin Production Planned In British Columbia

VANCOUVER — Another $5,000,000 may be added to value of British Columbia's woods if research now under way at Dominion Forest Products Laboratory at Vancouver, B. C., succeeds.

It will extract tannin, essential to tanning leather, from hemlock bark, which contains from 10 to 15 percent of the substance. First problem is to remove salt absorbed by the log in coastal boom transit.

India Hikes Natural Rubber Prices

NEW DELHI—Acknowledging the increased costs of the plantation industry the Indian government has approved increases in the cost of raw rubber of all groups which run to roughly 3.6c. per lb., bringing the Indian prices up to the neighborhood of $2.70 per lb.

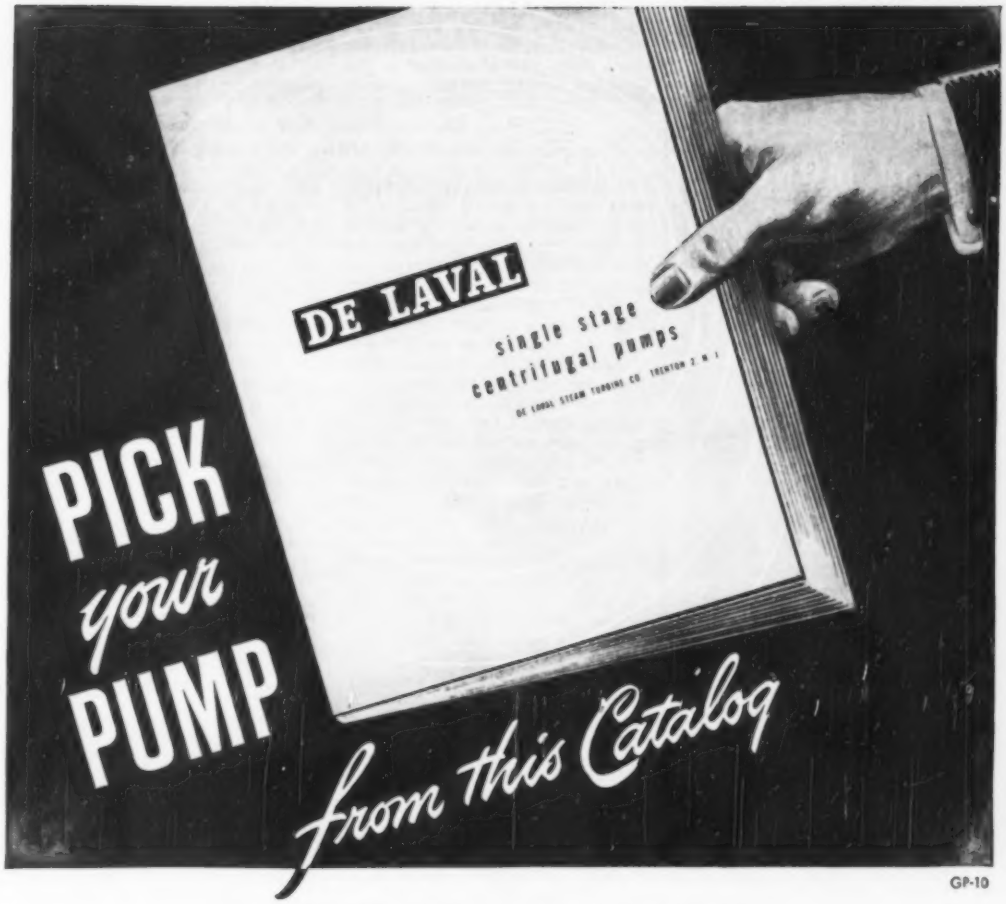
The increase was based on a special cost survey of the industry which showed that India has nearly 160,000 acres under rubber cultivation which produce some 17,000 tons annually. The per-acre output of roughly 300 lb. compares unfavorably with Ceylon's 350 lb. and the East Indies' figure of nearly 2,000 lb.

Free Isotopes for Canadian Firms

OTTAWA—More than 80 Canadian industrialists, representing varied manufacturing interests, have been briefed at the National Research Council of Canada in Ottawa on how radioactive isotopes may be put to work for industry. Leading scientists from Canada's Atomic Energy Project at Chalk River, Ont., were on hand to give demonstration lectures and to take charge of discussion groups concerned with some particular aspects of the isotope technique. Chemical engineers took a keen interest in this National Research Council conference.

Availability of scores of radioisotopes, each offering its characteristic type and intensity of energy emission, will soon bring the power of radioactivity into the service of industry on a scale not equalled or even approached in the past.

The Canadian Government has of-



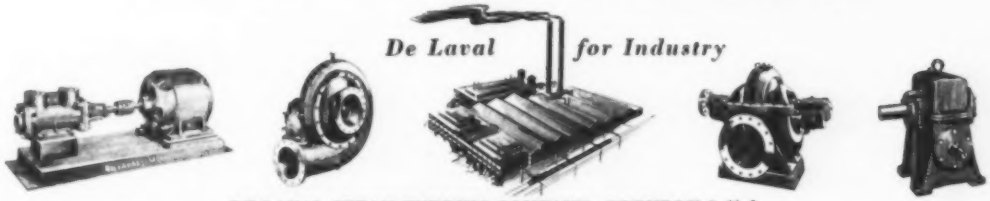
GP-10

COMPLETE WITH RATING TABLES AND DIMENSIONS

The text explains and illustrates features of design that you should look for when buying a pump. The simplified rating tables list pump and motor sizes for delivery and head requirements ranging from 150 gpm and 30′ head to 5000 gpm and 250′ head. The dimension drawings provide all information necessary for preliminary installation layouts. Ask for catalog GP-10.

DE LAVAL

De Laval for Industry



DE LAVAL STEAM TURBINE COMPANY · TRENTON 2, N. J.

TURBINES · HELICAL GEARS · WORM GEAR SPEED REDUCERS · CENTRIFUGAL PUMPS · CENTRIFUGAL BLOWERS AND COMPRESSORS · IMO OIL PUMPS

Compare the Quality!

STAINLESS STEEL and MONEL UTENSILS by METALSMITHS

Prompt delivery from stock on Pails, Measures, Dippers, Scoops, Funnels, Buckets, Beakers, Batch Cans, etc.

THE "extra value" in utensils by METALSMITHS, is put there by specialists in corrosion-resisting equipment, backed by more than 25 years of experience and working with the most modern fabricating equipment. METALSMITHS utensils are designed right, made right, priced right. Buy—try—compare!

Write for Illustrated Price List

METALSMITHS

Division of
Orange Roller Bearing Co., Inc.
564 White Street
Orange, N. J.

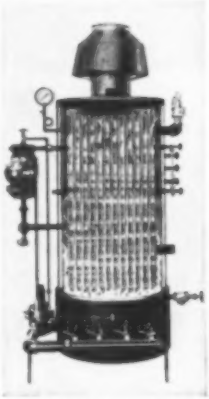
fered industry a year's free use of radioisotopes or tracer atoms from the Chalk River plant as an effort to spur Canadian industry forward in use of what was described by Trade Minister Howe as "the first great contribution of atomic energy to peacetime purposes."

Many Chemical Plants Will Go on Stream in Great Britain During the Coming Year

LONDON—British chemical makers normally receive long-term contracts and renewal notices for existing contracts in December. They report that some customers are less keen than in previous years to cover their anticipated chemicals requirements in advance. This reluctance to make forward commitments is not due to any falling-off of consumption. The amount of chemicals moving into consumption is larger than in prewar years and in most sections constitutes a new record. But many consumers feel that the supply position is definitely easier and that prices are also likely to ease in the not too distant future. Some price concessions, mostly of an insignificant nature, have already been reported. More important, the official control over the acquisition and use of a number of chemicals, including solvents in particular, was relaxed on the first of January. Even in fields where manufacturers have found it particularly difficult to keep up with consumers' needs, arrears are being worked off now. Further decontrol measures are expected as more plants come into operation.

The solvents position is expected to ease further as the result of a larger supply of hydrocarbon chemicals. In three or four months time the Shell Chemicals Ltd. will be able to offer considerable quantities of solvents for paints and lacquers which will be produced at the Shell plant in Cheshire. Other plants for the manufacture of chemicals from petroleum products are also scheduled to reach the productive stage in the first half of 1949. Thus it is reported that the first consignment of heavy naphtha has reached the Petrochemicals Ltd. for use in the Catarole process plant on the Manchester Ship Canal. Herring oil will also soon be available for industrial use. The bulk of the oil extracted at the first plant of this type, at Wick, is used for making margarine, but an outlet must now be developed for lower-grade herring oil, and processing plants are to be set up at Great Yar-

EVERY UNIT AN *"individual"* UNIT



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

the KANE BOILER PACKAGE

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job,—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Engineered Steam at its best, with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

ENGINEERED STEAM AT ITS BEST

MEARS·KANE·OFELDT INC.

1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.

FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE

DORRCO DOINGS IN 1948

1948 has been a year of gains and losses. The greatest overall gain, I believe, has been the definite actions which have clarified the world situation and brought a magnificent response at home—a response which indicates that, almost unanimously, we recognize the fact of one world. Truly may it be said that what is the concern of one must be the concern of all.

As to the future, I am reminded of the reply of the elder J. P. Morgan who was asked by a young man whether he knew what the market would do: "Yes," said Mr. Morgan, "it will fluctuate!" I think we can safely conclude that, whatever the trend today, the prospect of "Peace or War" will fluctuate for the next ten years or longer and we shall have to make the best of it. I believe, however, that the swing will be longer and longer toward the side of peace.

* * *

EUROPEAN ASSOCIATES—Many will be interested in knowing we have acquired a new home in Amsterdam—a 300 year old building of one of the old merchant princes. Owing to housing difficulties abroad, we will have rooms there, like the flats we maintain in London, available at times for friends in trouble.

All of the Dorr-Oliver companies in Europe have advanced and prospered in 1948 and gotten over the hump of the production problems which plagued them last year. Outstandingly large accomplishments were the supplying of numerous dewaxing filters for European oil refineries; the furnishing of processing equipment for titanium pigment manufacture in England and India; and the equipping of a number of cement mills in Western Europe.

CLASSIFICATION—The Classifying field for us is expanding with our acquiring the license and selling rights here in America for the Hydro-Cyclone of the Dutch State Mines for general use. It shows good possiblities for special classification conditions. We are also working on a development which should show the value of combined hydraulic and mechanical classification and its effect on grinding and flotation efficiencies.

SUGAR CANE & SUGAR JUICE—At the Waialua and Ewa Factories in Hawaii, the earth-laden water from the operation of cane washing, necessitated by "grab" harvesting, is passed to a Dorr Hydroseparator which yields a satisfactorily clear water for re-use and a thick sludge of soil and water for return to the fields.

To the famous Central Casa Grande in Peru has been delivered a duplicate of the world's largest cane juice clarifier—a 40 foot diameter Multifeed with 5 compartments. The first unit of this size is in operation at Chaparra of the Cuban American Sugar Company.

NON-METALLIC MINERALS—Florida phosphate is highlighted by the first installation of a new, heavy-duty, Dorr Hydroseparator and the installation of a 300 ft. Dorr Thickener in an earthen basin 750 ft. in diameter. The additional area in the latter case will slowly collect small quantities of ultra-fine slime particles which, it is believed, may not have to be removed during the life of the mining operation.

MUNICIPAL SANITATION—A successful, full-scale demonstration of the use of the Dorrco Vacuator ahead of sedimentation at Palo Alto removes the scum problem for plants where the amount of cannery waste does not exceed that of domestic sewage. This invites cooperation between industry and municipal plants. At the Hyperion plant in Los Angeles, our most recent Dorr Digester will be installed in 110 ft. tanks for primary digestion.

Our Biofiltration System of sewage treatment, used so widely during the War, is being adapted for peace-time plants with capacities up to 25 million gallons per day. The latest goes to Cobourg, Ontario.

CEMENT—Much has been done in cement plants the world over, including France, Belgium, and the Argentine. Two of the most modern plants in this country, completed this year, employ complete Dorr C.C.G. Systems, consisting of two stages of closed-circuit grinding, slurry thickening and slurry mixing.

COAL, CHROME & COPPER—The South's first, large, modern coal-cleaning plant, near Birmingham, is to use Dorr Hydroseparators and Thickeners, while a large middle western plant for leaching chrome sinter is to have two of our continuous countercurrent systems—one, consisting of four, large three-deck Dorr Washing Classifiers, for the coarser fractions and the other, consisting of five stages of decantation in Dorr Thickeners, for the finer fractions.

The great demand for copper has necessitated new plants and remodeling of old ones, and Dorr equipment has been largely in demand, including Classifiers, Bowl Classifiers, and large Thickeners.

FLUOSOLIDS & CONSULTING ENGINEERING—Two more Dorrco FluoSolids Systems have been placed under contract this year—one, now nearing completion, for a 100 ton a day lime calcination operation and the other for roasting daily 65 tons of arseno-pyrite gold concentrates. Our consulting staff, in addition to FluoSolids design, has worked on many diversified projects—a 2500 ton flotation mill, phosphate fertilizer plants, an alumina plant and magnesia from sea water investigations both here and abroad.

* * *

During the past summer, I combined a visit to our European associates with joining a small group that toured over 5,000 miles in a station wagon, visiting staff, offices and installations in order to obtain material for a colored film—"The Story of The Dorr Company". These visits ranged from Boliden in North Sweden to Venice. The warm cooperation met everywhere and the closer association with our own staff in Europe emphasized the essential unity and good will existing today across the Atlantic.

A three months' trip around the world made by one executive and a five months' trip made by another, covering the countries of Central and South America, together with frequent exchange visits of technical staff, all assist in our vision of "Dorrco World Wide!" This is evidenced by the visits to our offices, and especially "Westport", of technical men from all parts of the world.

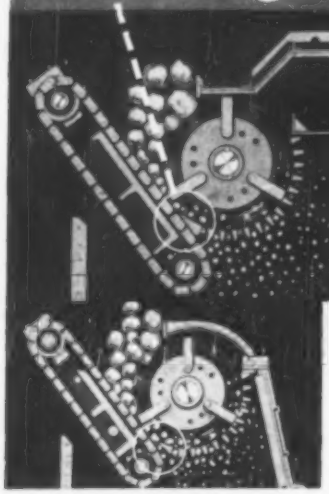
To our friends and to Dorr staff and associates we send New Year's Greetings and with them an expression of our strong faith in the future.

John Dorr

570 Lexington Ave., New York 22

DORRCO

BETTER CRUSHING BEGINS HERE!



Crushing money is saved or squandered in the "heart" of the mill . . . where reduction begins! That's why the headline feature of the new improved "36 Series" Dixie Hammermill is the extension of Dixie's Continuously Moving Breaker Plate*. . . a unique, money-saving innovation that sets a new standard of crushing efficiency.

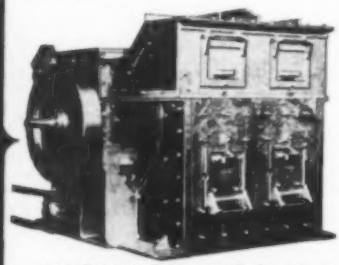
Note by comparing before and after diagrams how the new, Extended Moving Breaker Plate guards against the passage of oversize material between the breaker plate and front cage bar. The result —improved grinding control for unvarying uniformity of product that makes the Dixie Hammermill now, more than ever before, your guarantee of greater production at less cost.

NEW! IMPROVED!

DIXIE HAMMERMILL

Other important changes in the new "36 Series" Dixie Hammermill include:

- 1. All-steel construction for greater strength . . . longer life
- 2. Flange type end discs of all cast steel for protection of hammer bolts and nuts from wear at ends
- 3. Convenient clean-out and inspection door
- 4. Metal trap (optional) for facilitating removal of tramp iron.



Dixie "36 Series" Hammermills, for primary or secondary crushing, are built in 4 sizes in capacities ranging from 25 to 150 tons.

*U. S. Patents Granted and Pending

DIXIE MACHINERY MFG. CO.

WRITE TODAY FOR COMPLETE DETAILS!

MAIN OFFICE & PLANT
4172 GOODFELLOW AVE., ST. LOUIS 20, MO.
FOREIGN OFFICE: 104 PEARL ST., NEW YORK, N.Y.

mouth and Stornoway before the next season begins.

While earlier projects for the urgently needed expansion of Britain's alkali producing capacity are expected to begin to bear fruit in 1949, the alkali division of Imperial Chemical Industries Ltd. has embarked on a scheme for new extensions to the factories in the Northwich district of Cheshire, halfway between the industrial areas of Lancashire and Staffordshire, where the company's Winnington Works have been a large-scale alkali producer for the past 75 years. This new extension scheme should be completed by the end of 1953, by which time another 3,000 men or more are to be added to the company's payroll in the district. Extensions in the I.C.I. alkali division now nearing completion or envisaged under the new scheme are expected to cost over $50,000,000 and to add more than 50 percent to the company's existing alkali capacity. Such a big increase in production capacity of necessity raises the question whether the potential demand is not overrated, the more so as some of Britain's biggest export customers for alkalis are engaged in setting up or enlarging soda ash and caustic soda plants of their own. In view of the steady expansion of alkali consumption over the past decades, however, no more than temporary setbacks are anticipated, while the additional cost of excess capacity is apparently regarded as the lesser evil compared with the production difficulties and extra costs which have been met in the past owing to inadequate capacity and excessive wear-and-tear of overworked plants.

New Records for Rayon

The rayon industry, one of the biggest consumers of chemicals in Britain, reached a new output record toward the end of 1948. The total production of continuous filament yarn and staple fiber has now been established at a monthly rate of over 10,000 short tons, although the two leading producers, Courtaulds and Celanese, have been held up in their development programs by delivery delays of plant and equipment makers and several extension schemes had to be revised. The expansion of Celanese's cellulose acetate and chemical plant at Spondon has been somewhat delayed but should be completed by the middle of 1949. A new staple fiber spinning plant at Spondon is to be completed by the end of 1949. The erection of the proposed large spinning plant at Wrexham is held up by questions concerning supply services. Courtaulds has also been compelled to review earlier extension schemes, with the result that considerable delays occurred. But it

One of a series of messages to help you increase your understanding of business paper advertising, and its effect on your job.

Advertising is your boy!

SOME COMPANIES think nothing of investing hundreds of thousands of dollars in new machinery, in order to trim a few cents off their manufacturing cost per unit. Yet these same companies often waste such savings in costly selling methods – by expecting their *salesmen* to beat the brush for new prospects.

That's not what salesmen are for. Their time is too valuable. And it just isn't good business to send a *man* to do a boy's work. Not when you can use advertising as your "boy" – to do the same job faster, more efficiently, and a whole lot cheaper! For instance –

It costs about $10,000 a year, on the average, to put one good salesman into the field. Assuming that he can make about 750 calls a year, you get an average cost of something over $13 per call. That's not too high if your salesman can concentrate on *actual prospects*. But it's entirely too much to spend on "missionary calls" – especially when you consider that for the same $13 (and usually much less) advertising can make well over a *thousand* such calls on the readers of magazines like this!

Did we say *boy*? Actually, advertising works more like a machine. For by mechanizing part of the selling process, it reduces your cost of *manufacturing a sale*. Just consider the five basic steps required:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Advertising performs the first three of these steps. It leaves your salesmen free to concentrate on the last two – which they alone can do, and do best.

Nothing you invest in will go so far toward reducing your cost of manufacturing a sale. And nowhere will this investment yield a higher return than in the business press, where your advertising calls on the greatest possible number of interested prospects, at the lowest possible cost.

CHEMICAL ENGINEERING

is a member of The Associated Business Papers who are sponsoring this campaign. If you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, we'll be glad to mail them to you, together with a copy of an interesting folder entitled, "How Much Does NO Advertising Cost."

We're askin' for trouble-YOURS!

The Hersey Pilot Dryer
Experiments performed in this "Mechanical Guinea Pig" — prior to building production dryers — have saved Hersey clients untold thousands.

Got a drying problem that's a real tough hombre? There's one way you can be sure of getting the right solution the first time — turn it over to Hersey Engineers.

Here's how these experienced trouble-shooters work:

First, all aspects of your problem are studied and the product to be dried is analyzed. Then, with facts in hand, Hersey Engineers turn to the most important step of all: *tests in the famous Hersey Pilot Dryer.*

The only device of its kind, this dryer — often called "The Mechanical Guinea Pig" — was especially constructed for test drying all types of products on a limited production basis. It's as versatile as a scout knife — with only minor adjustments the characteristics of any type of rotary dryer can be quickly duplicated. Thus, a few simple tests show optimum drying conditions for your product *before a dryer is ever built.* Time and money are saved, *errors avoided.*

Decide now to take advantage of this exceptional service. Write today outlining your problem — no obligation.

All these cost-saving features are still found only in Hersey Dryers:

• Saw-tooth buckets • Metal-to-metal seals
• Permanently aligned ring gears • Intermediate feed systems

hersey-dryers

DIVISION OF HERSEY MFG. CO.
E & SECOND STREETS • SO. BOSTON, MASS.

is now expected that the rayon industry will call for greatly increased supplies of chemicals before 1949 is out.

Both rayon companies are proceeding with plans for the production of strong yarns. Courtaulds is erecting a plant at Preston for producing a strong viscose rayon yarn for use in making tires, and Courtaulds reports substantial progress in the application of its Fortisan fiber product. Celanese has also completed a pilot plant for the mass colorization of yarn in the spinning dope with the incorporation of the fastest pigments known to science. More nylon polymer for the nylon yarn plant at Pontypool, Wales, will be made available by the ICI plant at Billingham which, after some construction delays, is expected to be in production by the spring. One-third of the Pontypool plant is already in operation, and construction work on the other sections is nearing completion. While priority will be given to nylon yarn, the development of nylon sheet, and other forms of nylon is expected to follow suit.

More Fluorine Chemicals

Fluorine chemicals are among new products which are now introduced to interested industries with a view to the development of new outlets. Large quantities of British fluorochloro products will be available soon, sold under the trade name of Arcton to compete with U. S. products marketed under the name of Freon, which have found a market as refrigerants. In addition, pilot plants are now being operated by Imperial Chemical Industries Ltd. for making anhydrous hydrogen fluoride, large-scale production of which is also expected to start early in 1949, and for polytetrafluoroethylene, and pilot plants are being designed for making chlorine trifluoride, carbon tetrafluoride, sulphur hexafluoride, cobalt trifluoride, trifluoroacetic acid, trifluoroethanol and a range of aliphatic and aromatic hydrocarbons, some of them fully fluorinated and some with chlorine and fluorine substituents. These should be available for development purposes early in 1949, and it is hoped that they will find an outlet as catalysts, reagents, etc. Inert fluorinated greases and waxes are to be offered later.

Monsanto Chemicals Ltd. has acquired control of Silicon (Organic) Developments Ltd. which has been engaged on development work on modified silicate esters, and this work will presumably be continued and applied in practice under the new control. It is claimed that ethyl silicate has proved especially valuable in precision casting, and its use as a bonding agent in the refractory employed in casting turbine blades for jet propul-

TRY US FIRST

when you need Stainless Steel

Are you looking for Stainless? Then you'll be glad to learn that our stocks include: No. 2B Finish Sheets "par-excellence"; No. 4 Finish Sheets of uniform quality; bars meeting high standards of machinability; plates up to 120″ wide and 360″ long; welded and seamless tubing, pipe, angles, channels, welding electrodes in all standard grades and specifications.

Moreover, you can't beat U·S·S Stainless Steel for quality and proven excellence. And you'll get prompt, courteous service.

Fill in and mail the coupon — now — for free booklets on U·S·S Stainless Steel.

TURN IN YOUR SCRAP · The more scrap — the more steel

United States Steel Supply Company
Dept. N-19, 208 S. La Salle St., Chicago 4, Ill.
Without obligation on our part, please send us free booklets on U·S·S Stainless Steel as checked below.

☐ Fabrication Book ☐ Food Handling and Processing ☐ Petroleum Industry

Name..... Title.....
Firm Name.....
Address.....
City..... Zone..... State.....

SYMBOL OF SERVICE FOR STEEL USERS

UNITED STATES STEEL SUPPLY COMPANY · USS STEELS · SERVICE

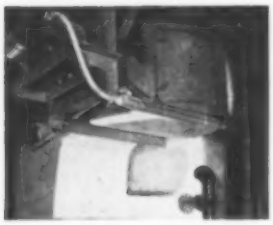
UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO
CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH
PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

USS

UNITED STATES STEEL

Wing Draft Inducers at the Famous "Tavern-on-the-Green"



One of New York's many unique hostelries is the famous "Tavern-on-the-Green" in Central Park, to which celebrities from every part of the world eventually gravitate.

In keeping with the rural setting of this modern "tavern", it is obvious that no unsightly tall chimney should rear its ugly head above the low-lying eaves of this building.

Yet a modern restaurant needs ample boiler capacity and boilers need draft, and in former days draft meant high chimneys.

But not today—Wing Draft Inducers in the "Tavern's" boiler room, installed in the breeching, give adequate draft, and insure even, efficient, economical combustion, regardless of variations in the weather.

Whether you are "up in Central Park" or "out by the Golden Gate"—or anywhere in between—take your draft problems to any Wing representative . . . or write direct.

L. J. Wing Mfg. Co. 170 W. 14th St., New York 11, N. Y.

Factories: Newark, N. J. and Montreal, Canada

Wing

DRAFT INDUCERS

sion power units promises to become very important. The demand for refractory materials has greatly increased, a fact which is reflected by expansion plans of existing refractory manufacturers and by increased attention to this field of chemistry by research workers.

The isolation of the anti-pernicious anaemia factor from liver in pure crystalline form is claimed to have been achieved by chemists of Glaxo Laboratories Ltd., a company which has also taken special interest in the field of anti-biotics. A few grains of this anti-pernicious anaemia factor only can be extracted from one ton of liver, but it is hoped that in the light of knowledge about the nature of the substance a further practical contribution will in due course be made to the treatment of the disease. The company's extensions at Barnard Castle and the reconstruction of the Greenford premises have been completed. The completed factory at Ulverston is expected to be in production by April, and it is hoped to increase greatly the output of streptomycin. Over $4,000,000 were spent by this firm on new buildings and plants in one year, and other pharmaceutical manufacturers have been compelled to make similarly large investments for the development of new productions. The resulting strain on their financial resources has been considerable, and new capital will therefore be needed for this branch of Britain's fine chemicals industry.

Canadian NRC Sets Up Liaison Offices

OTTAWA—The National Research Council of Canada reports that scientific liaison offices, originally established during the last war to facilitate exchange of classified technical information, are now being maintained on a permanent basis in London, Washington, and Ottawa itself to insure a continuous and rapid flow of certain science news to and from the Dominion of Canada.

Montecatini and Cyanamid Will Swap Know-How

ROME—Engineer Morandi, managing director of Montecatini, has given some particulars about the agreement for technical collaboration recently reached between Montecatini and American Cyanamid. It provides for a close understanding between the two companies with a view to improving their respective methods of production.

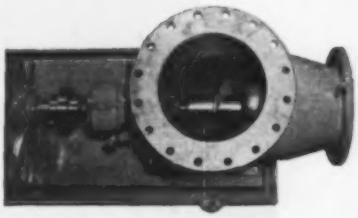
It gives the right to each of the two

heavy pulp moves *fast!*

BJ Six of the new *Pulp Pumps*

in series with the new BJ screw feeder pump, handle 8 to 10% Stock with ease

8 TO 10% STOCK IS HEAVY! But not too heavy for the pumping set-up engineered by BJ for a large Mid-Western pulp mill. Six 100 hp, 6″ x 12″ BJ *Special Duty* Pulp Pumps operate in a series. The suction of the first pump is fed by a 16″, 15 hp BJ Screw Feeder Pump. No suction line trouble, no clogging. Flow is smooth and positive. (These *Special Duty* Pulp Pumps are identical in design to the new *standard line* of BJ Pulp Pumps, except for impeller size.)



Top view of BJ Screw Feeder Pump

THE NEW BJ PULP PUMPS can be converted to acid and liquor service (or back to pulp stock service) merely by changing a few pump parts. For hot service, the standard stuffingbox can be replaced with water-jacketed stuffingbox. Entire bracket, rotating element and pump cover can be unbolted and lifted free from case without disturbing suction and discharge piping. Impeller clearance adjustable without dismantling. *Standard Pump Capacities to 4000 g.p.m. Heads to 200 ft. Sizes to 10″.*

BJ PULP PUMPS
STOCK CONSISTENCY RANGE

	Standard Pumps	Special-duty Pumps
Normal Range	Up to 6%	
Range with Screw Feeder Pump in Series	6% to 8%	8% to 10%

Byron Jackson Co.

Established 1872

LOS ANGELES 54, CALIFORNIA

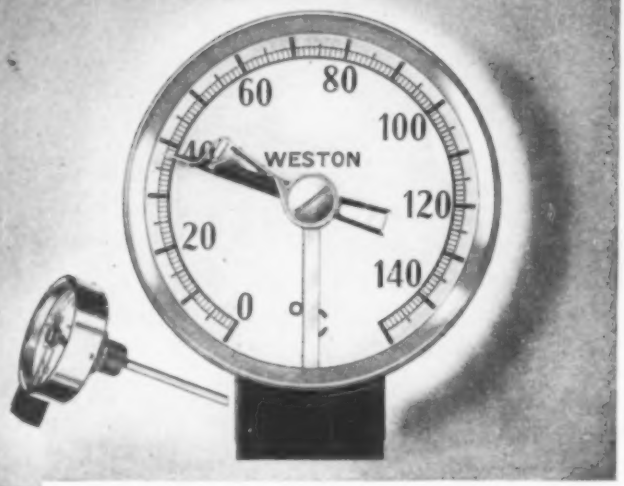
Offices in Principal Cities

NEW—

all-metal WESTON

Contact-making

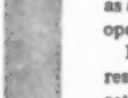
thermometer

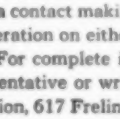


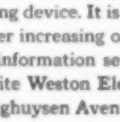
This new Weston combines the features of an indicating device with the advantages of an alarm or control instrument. A contact arm, mounted as shown above, is easily set to make contact at any temperature on the scale.

A terminal block on the periphery of the case makes electrical connection easy. The thermometer is all-metal, typically WESTON in ruggedness and reliability, with accuracy of ±1% as an indicating thermometer, and ±1½% as a contact making device. It is supplied in two types—for operation on either increasing or decreasing temperatures.

For complete information see your local WESTON representative or write Weston Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.


Industrial Thermometers


MAX-MIN Thermometers


Contact-making Thermometers

WESTON

Thermometers

parties to the agreement to develop in their respective zones of influence (Italy for the Montecatini and the United States and Canada for the American Cyanamid Co.) for each others patents.

The two companies also undertake to exchange promptly and continuously all information about their processes of manufacture, the research work and experiments they carry out, and the results secured. To assure the fullest results of this collaboration, arrangements will be made for the exchange of visits between the scientific and technical staff.

The agreement, after obtaining the approval of the Italian Government, has become effective, and visits have been made by the technicians of both companies to the plants of the other.

Reds Get Shoes From Sheepskin

Moscow — The leather resources of the Soviet shoe industry are reported to have been substantially increased through a new method of processing sheepskins to make chevrette, or kid leather, suitable for footwear production.

The new process was developed by the Central Research Institute of the Leather Industry about a year ago, and is described as differing radically from usual leather-making methods. Fats and artificial resins are applied in treating the sheepskin to give it the requisite firmness and good appearance.

Introduction of the new process took about six months at the Moscow chrome leather works, first to apply the method. This Moscow works is producing chevrette in black and brown colors by the new method. The process is also being applied at other tanneries throughout the country.

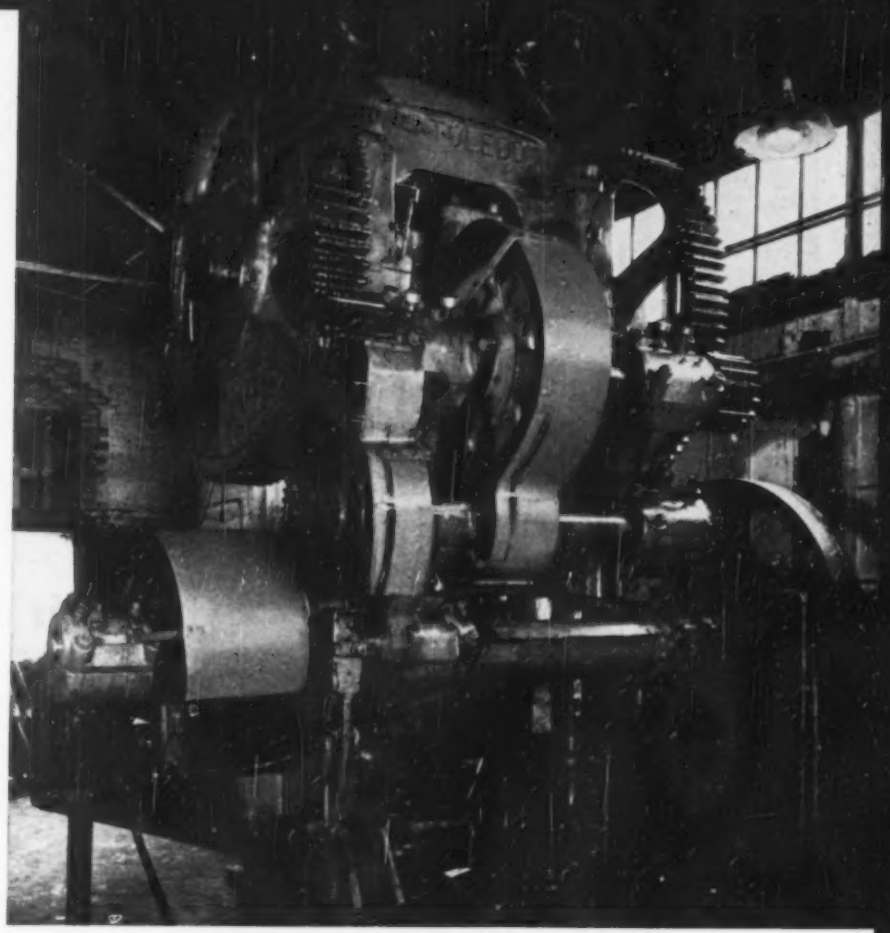
Shoe factories in Moscow and Rostov are already turning out footwear made from the new kidskin.

Catalyzed Oxidation Of Ascorbic Acid

MELBOURNE — Copper-catalyzed and enzyme-catalyzed oxidations of ascorbic acid in fruit and vegetable suspensions are discussed by F. E. Huelin and I. Myee Stephens in the Australian Journal of Scientific Research.

The following is based on abstracts presented in the Australian Chemical Institute Journal and Proceedings.

In phthalate and phosphate buffers the rate of oxidation of ascorbic acid increased with copper concentration up to 10-ppm. and with increasing pH up to 6.0. Oxalic, malic, citric and



Where gears are open for trouble, try...

THE exposed gears on stamping machines were a source of considerable trouble in a midwest plant. Noisy operation and lubricant throw-off created an undesirable working condition for the press operators. Moreover, gears required frequent applications of grease, interfering with production and raising lubricant consumption.

Conventional greases, tried on the gears, failed to remove the difficulties. A Standard Oil Lubrication Engineer suggested the use of Calumet Viscous Lubricant No. 2X, a grease of superior adhesive quality. This lubricant clung to the gears, eliminating drippage and throw-off troubles. Fewer applications of the grease were required. Gear operation was smoother and quieter.

Where open gears, as well as some enclosed types, are difficult to lubricate, try Calumet Viscous Lubricants. Unlike many conventional gear shields, these lubricants are true greases, fortified with additives. Their superior adhesive quality and greater wetting ability give them high resistance to the washing action of water and to thinning and throw-off at high temperatures. All grades of Calumet Viscous Lubricants can be applied without heating, and all but the heaviest grade can be applied by spraying.

Calumet Viscous Lubricants

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill., to secure the services of the Standard Oil Lubrication Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD

Producers of

SULPHUR

Large stocks at our mines make possible prompt shipments

Uniformly high purity of 99½% or better

Free of arsenic, selenium and tellurium

TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

tannic acids, sulphur dioxide, albumen, cystein and thiourea inhibited Cu catalysis. Thiourea gave outstanding "protection." Most fruit and vegetable tissues, and notably onion tissue, contained substances which inhibited Cu catalysis.

In experiments with enzyme-catalyzed oxidation, ascorbic acid oxidase activity was high in orange rind, parsley, French bean and cabbage suspensions, slight in onion and Swede turnip, and negligible in orange juice, rose hip and tomato suspensions. In many suspensions the oxidase activity was far greater than could be due to copper, if present in ionized form. In suspensions of cabbage in water the oxidase resided mainly in the insoluble particles, but the solubility was increased by neutral salts. The enzyme was precipitated by saturation with ammonium sulphate and had optimum activity at pH 6. In apple suspensions oxidase activity was variable and evidence was obtained that the mechanism of oxidation was largely indirect.

India Stops Issuing Licenses For Alkali Imports From U.S.

NEW DELHI—The Indian government has suspended the granting of licenses to import caustic soda and soda ash into India from hard currency countries. A dispatch from the American Embassy stated that the action is a result of the large stocks of these chemicals now available and the considerable value represented by outstanding import licenses.

Shell Budgets $24,200,000 for Research in 1949

LONDON—At the recent annual meeting of its research experts the Royal Dutch Shell Group adopted a $24,200,000 research budget for 1949. The program embraces fundamental research and all phases of research into petroleum, extending from the initial prospecting for crude oil to the use of all kinds of petroleum fuels, lubricants and other final products. The application of petroleum products in agriculture, especially in connection with problems arising in tropical areas, is to receive increasing attention.

About 4,000 employees are now engaged on research activities for Shell, whose laboratories in the U. K. (notably at Thornton, Cheshire), the Netherlands and the U. S. A. are among the most modern and best equipped in the world. Farms for agricultural research are established at Woodstock, Kent, and Modesto, Calif.

Deodorization of edible oils

Equipment designed, engineered, and constructed according to individual requirements by Foster Wheeler Corporation —specialists on processing units.

CONTINUOUS PROCESS

Foster Wheeler offers systems which will produce top-grade shortening and salad oils.

Deodorization — steam stripping of the refined oil to remove free fatty acids and all other undesirable volatiles—may be accomplished by either continuous or batch methods.

The FW continuous method permits dollar savings in steam, water, fuel and labor up to 50% of the batch processing costs.

Intimate counter-current contact between stripping steam and oil means less steam used per pound of oil processed. Heat losses are held down by employing heat recovery devices not practicable in batch systems.

batch system

FW batch deodorizer units are superior to the older steam heated systems because of the following features:

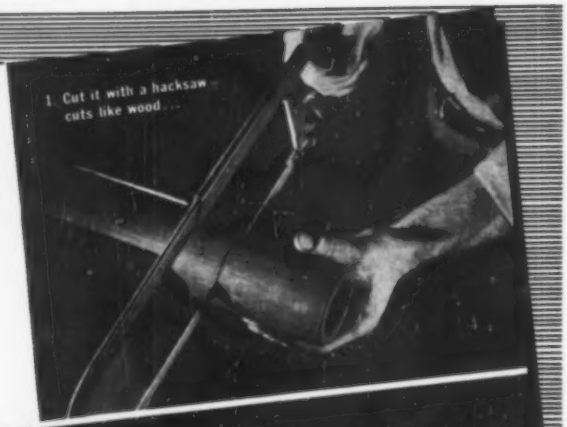
Dowtherm Heating
High Vacuum
Improved Final Cooling Technique

For full particulars about continuous or batch systems, write:

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

"KARBATE" Impervious Graphite Pipe is easy to cut...thread... or serrate!



KEEP "KARBATE" PIPE ALWAYS IN STOCK!

- Resists the action of acids, alkalis and other chemicals
- Light weight with adequate strength
- Resistant to mechanical shock
- Immune to thermal shock
- Easy to machine and install
- Full range of sizes and fittings

Write for catalog section M-8800B to National Carbon Company, Inc., Dept. CE.

The term "Karbate" is a registered trade-mark of
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y.
Division Sales Offices:
Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

These products sold in Canada by Canadian National Carbon Co., Ltd., Toronto 4, Canada

THE CORROSION FORUM

Edmond C. Feller, ASSISTANT EDITOR

Hydrochloric Acid versus Construction Materials

Part II of a symposium in which a representative group of construction materials are evaluated for services involving hydrochloric acid.

CARBON AND GRAPHITE

W. M. GAYLORD
National Carbon Co.
Cleveland, Ohio

PROBABLY the most important stimulus to the application of carbon, graphite and Karbate (National Carbon's trade name for impervious carbon or graphite) materials to the construction of chemical process equipment has been the severe corrosion problem presented in the handling of hydrochloric acid and hydrogen chloride. Today, just 12 years after Karbate's commercial introduction, more hydrogen chloride is being absorbed by means of equipment employing Karbate tubes or towers than all other construction materials combined. The permeable, as well as the impervious forms, of carbon and graphite all possess the combination of properties sought for in most hydrochloric acid service: Complete chemical inertness, complete resistance to thermal shock, high thermal conductivity (graphite is three times more conductive than steel), and low to moderate cost.

Experience with HCl has ranged from −40 deg. F. to more than 2,000 deg. F. Carbon and graphite, maintained at wall temperatures of 660 and 750 deg. F. respectively by cooling, are suitable for wet or dry HCl gases containing oxygen even at elevated temperatures. If water vapor but no oxygen is present in HCl gases, these limits are 1,110 and 1,200 deg. F. respectively.

Karbate equipment may be used up to wall temperatures of 340 deg. F. in wet and dry HCl of all concentrations. Hydrochloric acid heaters or boilers can be heated by steam at pressures up to 50 psig. Standard Karbate stripping and absorbing towers are designed for internal pressures of 25 psig. Standard pipe, fittings, valves and pumps are recommended for 75 psi. hydrostatic pressures.

From the multitude of applications, one that serves to illustrate the versatility of these materials is a system for the production of high purity anhydrous hydrogen chloride from raw, wet chlorine-caustic cell gases. The gases are introduced, without any cooling or drying, through a Karbate nozzle into a water-cooled, vertical graphite combustion chamber. Although flame temperatures range from 1,000 to 3,000 deg. F., depending on the feed gas composition, the gases leave the chamber at 350-500 deg. F. and are introduced directly to a Karbate falling-film type hydrochloric acid absorber. Both combustion chamber and absorber are operated under a slight vacuum provided by a Karbate steam jet ejector operated by steam pressures up to 125 psig. Karbate pipe, pumps and valves convey the 32-36 percent acid produced by the absorber into the Karbate stripping tower. This tower is usually operated at 15 to 20 psig. The constant-boiling acid bottoms at 260-270 deg. F. are heated by a Karbate shell and tube boiler with steam at 50 psig. The tower overhead product is dried by passage through water and brine-cooled Karbate condensers. HCl gas (over 99.5 percent) at 10 deg. F. averaging 0.01 percent water is delivered to process at 15-20 psig. From this point, so long as wall temperatures over 10 deg. F. are maintained, the gas can be handled by steel equipment. The 260-270 deg. F. bottoms are sent by a Karbate pump through a Karbate cascade or concentric tube cooler before entering the absorber as the absorbing liquor.

Absorbers have been in operation for ten years while the initial graphite HCl combustion chamber is still in service after six years. Since there is no attack of the construction materials in these systems, they are expected to last many more years.

Only two solutions containing HCl occurring with any frequency industrially should not be handled in carbon or graphite. They are sulphuric acid stronger than 96 percent used in HCl drying towers and aqua regia.

Carbon, graphite and Karbate successfully handle virtually all solutions containing HCl because they are chemically inert to all but strong oxidizing solutions. Examples include: By-product HCl from organic chlorinations; metal pickling, cleaning and etching; HCl hydrolysis of cereal foodstuffs and vitamin slurries; HCl hydrolysis of paint pigment slurries; and HCl and magnesium chloride.

TANTALUM

LEONARD R. SCRIBNER
Fansteel Metallurgical Corp.
North Chicago, Ill.

WHILE there are many metals and alloys that are resistant to hydrochloric acid to a greater or lesser degree, tantalum is completely immune to this acid at all concentrations or temperatures at which it has been tested or used. Tantalum, moreover, has been found equally immune to mixtures containing hydrochloric acid. Even aqua regia, which attacks gold or platinum, has no effect whatever upon tantalum. No other organic or inorganic mixture containing hydrochloric acid is known to attack tantalum at temperatures below 175 deg. C., excepting those containing hydrofluoric acid or free SO_3.

With hydrochloric acid, either alone or mixed, tantalum is an ideal

dust off your production line

for more economy savings quality profits

more economy Pangborn Dust Control gives you more economy of plant operation by removing industrial dust from working areas. One Pangborn customer compared his expenses before and after installation of Pangborn Equipment and revealed savings of $8000 per year.

more savings Pangborn Dust Control can save you money as it did for a well-known foundry where Pangborn Equipment corrected problems impairing worker efficiency, speeded up production and indirectly saved 25%.

more quality Pangborn Dust Control gives you new opportunities for improving the quality of your product by providing you dust-free operation. A soap manufacturer states that Pangborn Equipment has increased product quality and reduced plant maintenance as well.

more profits In many cases Pangborn Dust Control can help you salvage by-products for added profits. You may be able to salvage $5000 yearly, as a cork company, customer of Pangborn, has done with our equipment.

Let us make a dust pocket survey in your plant. There's no obligation. With the information we obtain we can present recommendations for a Pangborn Dust Control System to fit your needs and rid your plant of dust losses. Write for Pangborn Bulletin 909A to PANGBORN CORPORATION, 283 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.

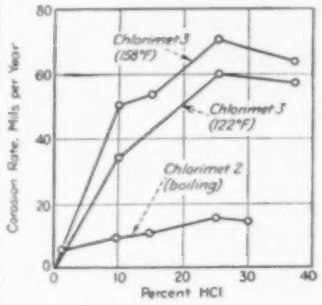
STOP THE DUST HOG from stealing profits with

Pangborn

DUST CONTROL

material of construction not only because it is immune to attack, but also because, being a metal, it has excellent heat transfer properties. The metal is used in thin wall sections, and because there are no heat-blocking surfaces due to partial corrosion, high over-all efficiency is obtained. Between steam and hydrochloric acid, for example, coefficients above 3,000 Btu./sq. ft./hr./deg. F. are common. While coefficients for cooling or condensing are somewhat lower, they are still very high in comparison with other materials of construction.

The practicality and economy of tantalum for use with hydrochloric acid has become widely recognized in the past decade. Hundreds of tantalum heat exchangers, including coils, bayonet heaters, condensers and absorption plants are in service throughout most of the world. There has never been a reported case of failure due to corrosion.



CHLORIMET

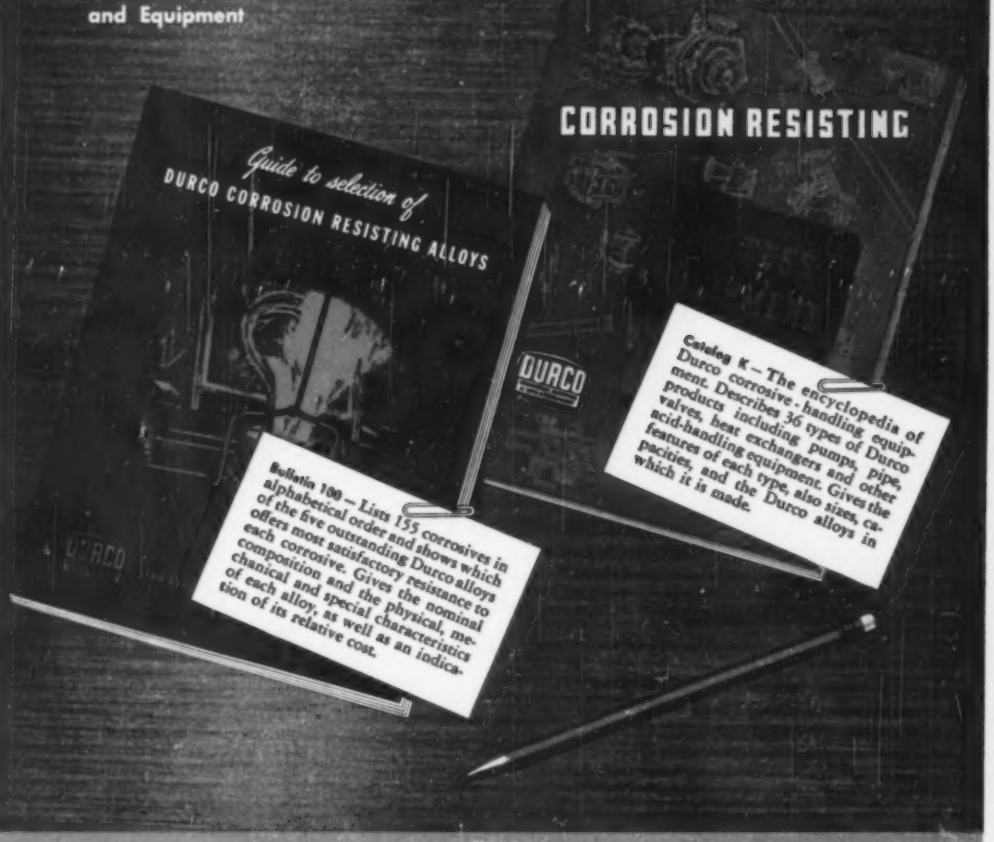
WALTER A. LUCE
The Duriron Co.
Dayton, Ohio

CHLORIMET-2 and Chlorimet-3 are finding extensive application for services throughout the chemical industry where hydrochloric acid and solutions containing hydrochloric acid are encountered. Chlorimet-2 is a high nickel-molybdenum alloy with a nominal chemical composition of 63 percent Ni, 32 Mo, 3 Fe max., and 0.10 C. Chlorimet-3 is also a nickel base, high alloy with a nominal chemical composition of 60 Ni, 18 Mo, 18 Cr, 3 Fe max., and 0.07 C max. Both of these alloys are produced in the cast form only and are machinable.

Chlorimet-2 shows good results in all concentrations of hydrochloric acid even at boiling temperatures (see graph). The corrosion rate of Chlorimet-2 increases as the concentration of the boiling acid increases. However, at all times the corrosion resistance can

IF YOU HAVE CORROSION PROBLEMS THESE BOOKS SHOULD BE ON YOUR DESK

They Cover Durco's Complete Line of Corrosion-Resisting Alloys and Equipment


Guide to selection of
DURCO CORROSION RESISTING ALLOYS
CORROSION RESISTING
DURCO
Bulletin 100 — Lists 155 corrosives in alphabetical order and shows which of the five outstanding Durco alloys offers most satisfactory resistance to each corrosive. Gives the nominal composition and the physical, mechanical and special characteristics of each alloy, as well as an indication of its relative cost.
Catalog K — The encyclopedia of Durco corrosive-handling equipment. Describes 36 types of Durco products including pumps, pipe, valves, heat exchangers and other acid-handling equipment. Gives the features of each type, also sizes, capacities, and the Durco alloys in which it is made.

To get your free copies of both of these bulletins, simply fill out the coupon and put it in the mail.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON CO., INC.
DAYTON 1, OHIO
Branch Offices
in Principal Cities

THE DURIRON CO., INC., DAYTON 1, OHIO

Please send me, without cost or obligation, copies of your Catalog K and Bulletin 100.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

SYMBOL OF STURDY HIGH PRESSURE COMPRESSORS FOR OVER 80 YEARS

Each Norwalk Compressor is individually assembled, from modern, interchangeable parts, for its specific application. Each is set up and test-run at the factory before final inspection. No wonder customers always ask for Norwalk.

Norwalk Company, Inc.

South Norwalk, Conn.

be considered as good. The 25 and 30 percent points of the graph represent hydrochloric acid concentrations at the beginning of each test period. Gaseous hydrogen chloride will be slowly expelled from the test solution, despite the use of condensing methods, thus constantly lowering concentration until 20.24 percent HCl is finally reached.

The Chlorimet-3 alloy is definitely not recommended for boiling hydrochloric acid at any appreciable concentration. A corrosion rate of about 600 mils per year was obtained for Chlorimet-3 in 5 percent boiling hydrochloric acid with a steady increase for higher concentrations. The graph shows the corrosion of this alloy in hydrochloric acid at 122 deg. F. and 158 deg. F. In general, the Chlorimet-2 alloy (no Cr) is preferred over Chlorimet-3 for hydrochloric service, unless oxidizing conditions exist.

A number of actual plant services involving hydrochloric acid solutions which were successfully resisted by the Chlorimet alloys will be cited below. The successful application of these alloys in the field augments the laboratory data shown in the graph. It was usually necessary to resort to the Chlorimets when other alloys failed to handle the particular solution involved, or when only a low amount of corrosion was tolerable.

(1) Several Chlorimet-2 pumps are giving excellent service in the production of anhydrous hydrochloric acid which involves the handling of various concentrations of very hot acid. (2) Chlorimet-2 pumps and valves are also being successfully applied for handling hydrochloric acid of various concentrations and temperatures in a plant producing dyes and detergents. (3) Chlorimet-3 shows excellent resistance to a scrubber solution consisting of a mixture of hydrochloric acid, sulphuric acid, nitric acid, selenous acid and sodium chloride at 140-150 deg F. (4) Chlorimet-2 centrifugal pumps are giving nearly two years service without noticeable corrosion for handling hydrochloric acid up to 35 percent concentration at a temperature of 120 deg. F. in connection with a hydrochloric acid recovery system. (5) Plant corrosion tests conducted over a six week period on Chlorimet-2 in a reaction product solution composed essentially of hydrochloric acid contaminated with toluene and benzoic acid at 122 deg. F. showed an acceptable corrosion rate of 4.7 mils per year.

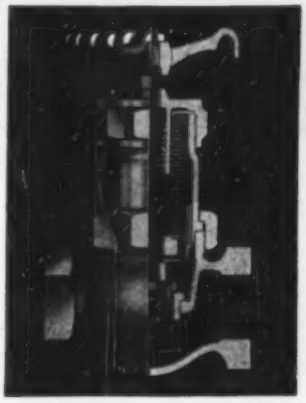
The presence of appreciable ferric chloride in hydrochloric acid solutions involves an exceedingly difficult handling problem. Chlorimet-2 is rapidly attacked under these conditions. However, introductory laboratory tests conducted on Chlorimet-3 in many hydro-

If your "liquid assets" are HAZARDOUS

—YOU NEED SYLPHON PACKLESS VALVES

Hazardous leaks, even tiny ones, can be *stopped for good* . . . with Fulton Sylphon Packless Valves. Installed on pipe lines carrying gasoline, oil, or other volatile liquids or vapors, they protect you and your equipment against waste, explosion, fire, other damage. The valve's dual-ply, seamless Sylphon metal bellows replaces customary packing . . . eliminates leakage that can seep past the stuffing box of an ordinary packed type valve. The bellows provides a positive seal—is metal-housed for protection against erosion. Available in many sizes and types with body made of brass, bronze, cast iron, cast steel, stainless steel or monel.

Widely used in chemical plants, oil refineries, power plants, aboard ships—or wherever steam, air, gases or liquids are handled. Write today for Bulletin AG-813.



No. 304-N Sylphon Packless Valve comes in sizes from ½" to 2" for pressures up to 150 lbs. Also available in larger sizes is No. 1304 with flanged connections for liquid pressures up to 80 lbs. No. 304-NV is ideal for vacuum service.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

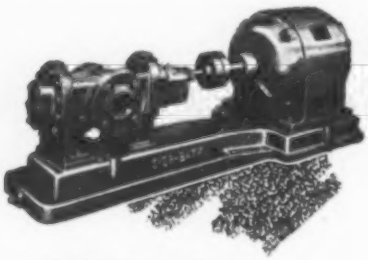
Canadian Representatives, Darling Brothers, Montreal

Can a pump be TOO GOOD?

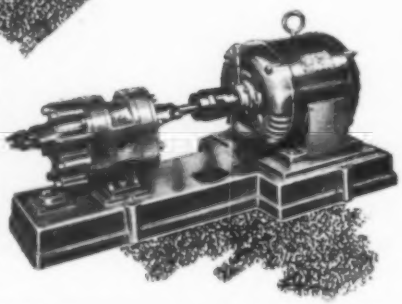
WE believe that no pump used in industrial processes can be too good. The cost of only one shutdown for pump replacement or repair often exceeds the difference in price between the best pump it is possible to obtain—and the second-best.

That is why we put *everything* that engineering ingenuity can devise into Sier-Bath Screw Pumps and Gearex Pumps. As a result, Sier-Bath Pumps are noted for their dependability and durability and for requiring the absolute minimum in down-time for maintenance.

Sier-Bath Screw Pumps and Gearex Pumps are made in a modern plant under the best working conditions, by a company that has long been noted for the manufacture of precision gears. In the making of our pumps we adhere to the rigid standards of high quality that have made Sier-Bath Precision Gears famous among manufacturers of quality products. Send for booklet on Sier-Bath Screw Pumps or Sier-Bath Gearex Pumps.



SIER-BATH Screw Pump Advantages: Pulseless flow, anti-friction bearings, vibrationless operation, low maintenance costs, rugged construction. Pumps acetate, asphalt, brines, bunker C fuel oil, cellulosics, greases, molasses, syrups, lube oil, etc.



SIER-BATH Gearex Pump
Advantages: balanced axial thrust, vibrationless operation, roller bushings for precision running under load. Pumps oils, varnishes, solvents, molasses, chemical solutions. Capacities 1-550 g.p.m. Discharge 250 p.s.i. for medium or high viscosities, 50 p.s.i. for water.

ALSO MAKERS OF SIER-BATH PRECISION GEARS

FOUNDED 1905 MEMBER A. G. M. A.

Sier-Bath GEAR and PUMP CO., Inc.

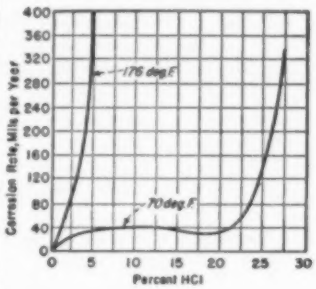
9259 HUDSON BOULEVARD • NORTH BERGEN, NEW JERSEY

chloric acid-ferric chloride mixtures at room temperature indicate that it may be successfully applied under certain conditions. It is recommended that tests be conducted on this particular mixture before using the alloy on a commercial scale.

IRON AND STEEL

A. W. SPITZ
American Cyanamid Co.
New York, N. Y.

CAST IRON and carbon steel can be used for handling either dry hydrochloric gas or hydrochloric acid vapors if they are at sufficiently high temperatures to prevent condensation. All concentrations of hydrochloric acid in the liquid phase corrode iron and steel rapidly and their use is not recommended for this service.



WORTHITE

W. E. PRATT
Worthington Pump & Machinery Corp.
Harrison, N. J.

WORTHITE is commercially resistant to weak, cold solutions of pure hydrochloric acid, and is widely used in pumps and valves due to its relatively low cost as compared with more resistant alloys.

The corrosion resistance of Worthite in hydrochloric acid solutions at 70 and 176 deg. F. is shown in the chart. The corrosion curves are based on 24-hr. laboratory tests with air agitated solutions. The severity of attack at the higher temperature is apparent.

In general, impurities in the form of metal chlorides act as accelerators of corrosion. Ferric chloride and cupric chloride are notably active and their presence eliminates the use of Worthite as an economical application, even in weak acid solutions. Thus, Worthite pumps are not suitable for circulating hydrochloric acid solutions used for pickling steel or brass.

However, some mixtures involving

what's back of the purest chemicals?

Careful selection of raw materials, scientific and economical processing are important factors in the manufacture of industrial chemicals. Uniform purity, stability, and competitive production costs are the results demanded. That's why chemical engineers rely on the Sperry Plate Filter Press as a vital element in their production scheme.

The Plate Filter Press offers many advantages over other types. It handles practically any filterable mixture—it's dependable under varying conditions—simple in construction and operation. Just a few of the reasons why it's the most widely used filter today—serving hundreds of manufacturers in many different industries.

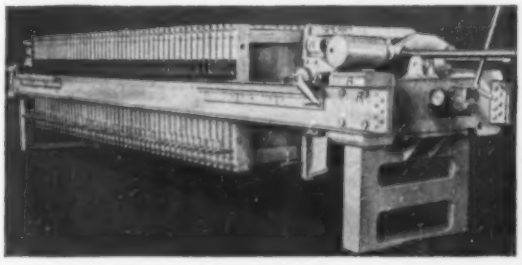
Whatever your product, if it requires filtration, call on Sperry. Our experience and facilities are available to you at any time.

D. R. SPERRY & COMPANY • *BATAVIA, ILLINOIS* • *Filtration Engineers for over 50 years*

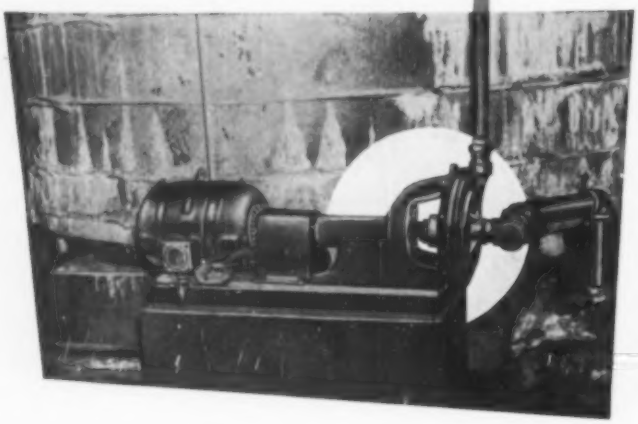
Eastern Sales Representative • H. E. Jacoby, M. E. • 205 E. 42nd St., New York 17, N.Y. • phone: MUrray Hill 4-3581

Western Sales Representative • B. M. Pilhashy • 1033 Merchants Exchange Bldg., San Francisco 4, Cal. • phone: Do 0375

SPERRY
FILTER PRESSES



RUGGED DIET
for standard pumps



A standard Deming Centrifugal pumping lithium salt.

● A six-year diet of lithium salt had no serious effect on standard Deming Centrifugal Pumps in a Minneapolis chemical plant. According to the owners, replacement of parts has been negligible.

A total of 61 Deming Pumps of various types are used in this plant. Largest number are Deming Side Suction, Two Ball Bearing Centrifugals. Outstanding feature of these pumps is the separate liquid end.

This type of construction makes it economical to have only the liquid end parts of special alloys for pumping corrosive liquids. The support head can be of cast iron construction.

The advantages are two-fold: lower first cost and minimum costs of repairs or replacements on the separate liquid end parts.

View at right shows a Deming Deep Well Turbine Pump used for low cost water supply in the plant mentioned above. Deming Turbines are water lubricated. No oil or grease is required. Water supply is protected from contamination by such lubricants as none are used.

For complete information on Deming Centrifugal Pumps and Deep Well Turbine Pumps, write . . .

● THE DEMING COMPANY • 525 BROADWAY • SALEM, OHIO

DEMING
THE COMPLETE LINE
PUMPS AND WATER SYSTEMS

hydrochloric acid may prove to be less corrosive than the pure acid. Thus, a sulphite pulp mill reported the results of a test on Worthite in the seal pit of the No. 1 washer following the bleacher, as follows: "This effluent has a pH of approximately 2.0-2.4 and consists largely of dilute hydrochloric acid plus some hypochlorous acid due to free chlorine. Worthite showed no loss."

Uses of Worthite Pumps

The most frequent application for Worthite pumps in the handling of hydrochloric acid is for circulating dilute, inhibited muriatic acid for cleaning boiler tubes, condenser tubes, feedwater heaters, and evaporators in chemical descaling. The inhibitor prevents the pickup of any significant amount of metal chlorides, and the strength and temperature of the acid are limited to prevent damage to the equipment being cleaned. It is interesting to note that iron or bronze do not stand up in this service due to the high velocities that exist inside the casing. In this service the upper limits of concentration and temperature have been set at 15 percent HCl and 100 deg. F. for economical use of Worthite. Occasionally higher temperatures have been reported for Worthite pumps in service without serious results, but the higher temperatures are usually associated with lower acid concentrations. The long life (up to eight years to date) of Worthite pumps in these services is explainable as the service is not continuous and the chemical reaction with the scale (which is usually calcium carbonate) quickly reduces the effective strength of the acid.

In a public utility steam generating station where Worthite pumps have given eight years service in the monthly cleaning of the boilers the inhibited acid has been used up to 10 percent strength and up to 140 deg. F. The tip speed of the impeller running at 1,750 rpm. is approximately 87 fps.

In descaling Clarkson boilers used for generating steam on Diesel locomotives, a Worthite pump is used several hours daily. The inhibited acid is diluted 3:1 or to about 12 percent HCl. Occasionally high temperatures were encountered due to pumping the acid through warm boilers and also due to occasional clogging in the tubes when the acid may have reached a temperature near the boiling point due to churning. This is a high speed pump and it develops a pressure of 75 psi. at 25 gpm. At this pressure a boiler is cleaned in about 45 min. compared with 4 hr. required by pumps previously used developing 30 psi. The tip speed of the Worthite pump impeller is about 95 fps. The pump required

XRD-3B—*the basic unit*
XRD-3F—*for film technics*
XRD-3S—*the x-ray spectrometer*
XRD-3D—*for direct measurement*

Analyze directly with the XRD-3!

Go beyond the microscope. Dig down into the fundamental structure of matter. Find the atomic positions, ionic groupings and crystallographic systems of substances. And do it economically – with the XRD-3.

Whether you are working with metals or metal alloys . . . ores, clays and other mineral structures . . . paints and pigments . . . ceramics and glass . . . cement and plaster . . . textiles and fibers . . . or rubber and allied products . . . you'll get more information – faster – with the XRD-3. Here's why!

You are sure. You get G-E accuracy in the XRD-3. Latched ma and high-voltage positions reproduce settings accurately for long series of experiments. Exposure timer is correct to within 60 seconds in a twenty-hour range. X-ray intensity is constant; plus or minus ½ per cent. Resolution of diffraction data is optimum—for powder data, 0.02 degree maximum.

You are completely equipped. There are available for use with the basic XRD-3 components which make possible (1) the direct measurement of diffracted intensities, (2) the direct measurement of fluorescent x-ray spectra, (3) all film technics. All XRD cameras and many others fit the standard diffraction instrument support. The clear flat top around and under the tube makes the adaption of other cameras simple.

You are seated. You work at a desk-type console. All meters and controls are within easy reach. You read spectrogoniometer angles from stationary indicators without your leaving your chair. Controls, transformer *and* water cooler are *within* the console.

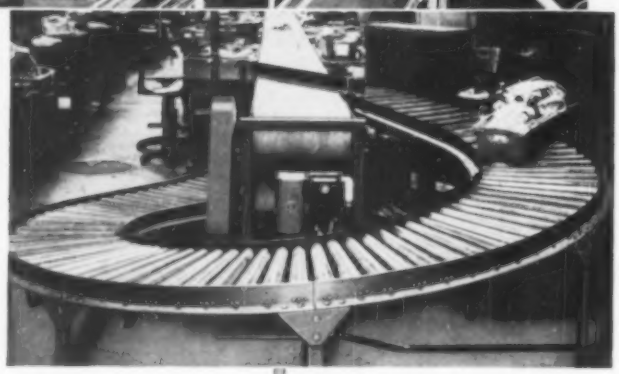
FREE—The story of the most modern of diffraction devices—the XRD-3. Write General Electric X-Ray Corporation, Dept. A-5, 4855 W. McGeoch Ave., Milwaukee 14, Wisc.

GENERAL ELECTRIC X-RAY CORPORATION

General Electric X-Ray Corporation manufactures and distributes x-ray apparatus for industrial, dental and medical use; electromedical apparatus; x-ray and electromedical supplies and accessories.

CONVEYORS LIKE THIS WON'T CUT YOUR COSTS

Looking for a way to get material from one part of your plant to another . . . you wouldn't consider the burro as the best answer. The real answer to fast, economical material handling is Standard Conveyors —a system, a section or a portable powered unit. Standard Conveyors are built for almost every material handling need, from mail to malleable iron castings. Look over your shop or warehouse, there's more than an even chance you can save time, money and labor with a Standard Conveyor. Standard Conveyor Company, General Offices: North St. Paul 9, Minn., Sales and Service in Principal Cities.



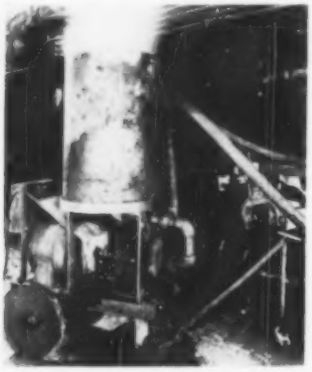
FREE HELPFUL LITERATURE

Send for Standard's Catalog. See how conveyors are used in every field of industry. Ask for Bulletin No. CM-19

Standard GRAVITY & POWER CONVEYORS

repairs in seven months. A bypass has been installed on the pump to prevent overheating of the acid and it is expected much longer life will result.

The cleaning of locomotive feed water heaters is one of the most common applications for Worthite pumps in the handling of muriatic acid. A typical installation is illustrated; it is a portable unit which is wheeled up to the locomotive for cleaning the feedwater heater without removing it.

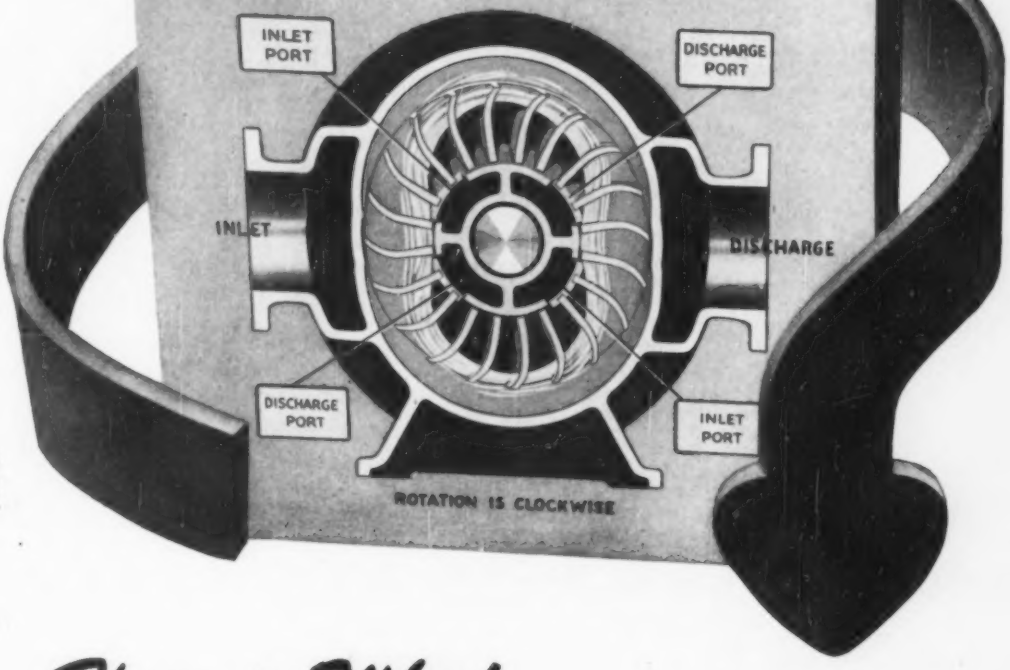


Portable descaling unit with Worthite pump. Circulates inhibited HCl through locomotive feed water heater tubes.

Some other applications, involving small percentages of hydrochloric acid, are associated with the manufacture of dyes and dye intermediates, pharmaceuticals, methyl chloride, and others. Worthite pumps have proved to be an economical investment in many of these processes, even where some repairs are required yearly. It is difficult to predict in advance by ordinary corrosion tests whether Worthite should be used or some more resistant material. Other factors than corrosion resistance may have to be considered. First cost, availability, performance, frequency of use, length of life required, and suitability for use with other corrosive agents in the plant, all may play a part in the final selection of a pump or other equipment.

Preliminary tests should be made, where possible, in the actual process over a considerable period of time. Test specimens should be examined carefully for any tendency toward pitting. A few scattered but relatively deep pits would indicate possible early failure of a pump handling the solution. The physical appearance of the specimen exposed to solutions containing hydrochloric acid or acid chlorides is usually a better guide than the over-all corrosion rate expressed as inches penetration per year.

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
373 WILSON, SO. NORWALK, CONN.

Little filtration faults can make costs BIG

"Visiting with the filter operator, certain practices were noted which certainly did contribute toward high turbidities. Most notable was shutting off the feed to a press after this press was almost spent, and allowing the press to drain. According to the filter operator, when the feed is again turned on at high pressure they get a very substantial flow. It is plain to see that shutting off the feed allowed the cake to drop, and when they turned on the feed again they naturally got a temporary high flow, because it would be the same as pre-coating on a fresh cloth.

"This plant also starts the filter presses on gravity feed. In this connection two bad practices were noted. First, if they do not need the filter right away it is allowed to drizzle at a very low flow, probably allowing some settling of filteraid. Second, when they do turn over to the pump feed, their practice is to shut off the pump feed, before turning on the gravity feed. This, of course, makes it possible for the filter cake to fall off, or at least be disturbed.

"Mr. _____ did not know of these faults, and now feels sure that when they are corrected, their troubles will be cured."

(FROM REPORT OF A DICALITE ENGINEER)

Keep costs in line in '49—USE DICALITE FILTERAIDS

SEND FOR YOUR COPY . . . . . . of this Dicalite Technical Service Bulletin B-11. Covers fundamentals of filtration and describes ways to secure best results from diatomaceous filteraids. Sent without charge.

If you feel your filtration costs are getting out of hand, or if you feel that operating efficiency is low—why not call in a Dicalite Engineer? Perhaps you have "trouble," such as low flow rates, unsatisfactory clarity, or haze or bacteria that defies removal. From wide experience he can recommend the most suitable grade of Dicalite filteraid for the job; he can also check your present procedure for any change to improve efficiency and reduce costs. Telephone or write the Dicalite office nearest you for prompt action.

DICALITE
DIVISION
GREAT LAKES CARBON CORPORATION
New York 17, N. Y. Chicago 13, Ill. Los Angeles 14, Cal.

DICALITE FILTERAIDS

NAMES IN THE NEWS

Man of the Month

Carl S. Miner

Carl Shelley Miner, Chicago's well-known "Father of Furfural Chemistry," received the Perkin Medal January 7. This high honor, made annually for outstanding work in applied chemistry, was presented in New York at the meeting of the American Section of the Society Chemical Industry.

Carl Miner received his B.S. from the University of Chicago in 1903. After graduation he went to work as a chemist for the Corn Products Co., a predecessor of the present Corn Products Refining Co. In 1906 he left and started a consulting business in Chicago. This institution, the well-known Miner Laboratories, has grown to the extent that it is an integral part of the industrial structure of the Midwest.

"Chemurgy" has received a great deal of publicity, but Carl Miner has been one of the foremost exponents of the potentialities of this field. His dream in 1920 that annual crops could be a source of chemicals matured into furfural—the widely used solvent.

During the recent war Mr. Miner was a member of the referee board of OPRD. He also served as a consultant for the Baruch Rubber Committee. His connection with Commercial Solvents Corp. led to the development of a riboflavin supplement; he was an active member of the research committee when the new group of nitroparaffins was pioneered.

He was instrumental in developing antioxidants for glycerine anti-freeze and the formulas used in inks, printers' rolls and dehydrated vegetables. Hydrogenation of starches, utilization of sawdust, exploded vermiculite, and beverages from beer to orange juice have all been studied and improved by Miner Laboratories under the direction and guidance of Mr. Miner.

He is a member of ACS, AAAS and the American Association of Cereal Chemists. His offices are in Chicago; his home in Glencoe.

J. W. Dykes, formerly production manager of Calco Chemical division of the American Cyanamid Co. is now assistant plant manager; **J. F. Bourland** has been promoted to chief plant chemist, replacing **Harold F. Lacey** who was transferred to the Bound Brook, N. J., plant.

William M. Murray, Jr., has been named permanent director of the Southern Research Institute, Birmingham, Ala. Dr. Murray has served as acting director since the retirement of **Wilbur A. Lazier** last March.

C. H. Peck, formerly with Naval Ordnance Laboratory, White Oaks, Md., has joined the pyrotechnics and smokes branch, munitions division, technical command, Army Chemical Center, Md., as a chemical engineer. Other chemical engineers recently added to the staff of the technical command include: **M. R. Hardenburgh, Hoyt C. Neal, Edward S. Stern, J. J. Keenan** and **Billy E. Wilson.**

Fred Allison has been appointed dean of the graduate school and director of the Auburn Research Foundation of the Alabama Polytechnic Institute. He succeeds **Russel S. Poor**, who has resigned to become chairman of the university relations division, Oak Ridge Institute of Nuclear Studies.

Marston Taylor Bogert, emeritus professor of organic chemistry, Columbia University, and senior scientific consultant and advisor for Evans Research and Development Corp. of New York, has been appointed by the board of trustees of Columbia University as Charles Frederick Chandler Lecturer and Medalist for the year 1948.

Robert E. Bounds has been appointed staff engineer with the insulations division of the Paraffine Co., Inc., His new headquarters will be at Pabco's home office in San Francisco.

Albert E. Sidwell, Jr., has been appointed assistant director of research and **Ralph F. Wolf** is manager of compounding research at Columbia Chemical division of Pittsburgh Plate Glass Co.

A. E. Sidwell, Jr.

R. F. Wolf

Paul W. Hiller, special representative for Innis, Speiden & Co., New York, has been appointed manager of the company's newly-formed products development department. The new department will coordinate work in the company's three fields—chemicals, gums, waxes.

Robert F. Elder has been appointed to a newly-created position of vice president in charge of affiliated companies of Lever Brothers Co.

J. B. Wiesel who has been director of sales for Hercules Powder Co.'s cellulose products department since 1930 is now assistant to the general manager. **Carl W. Eurenius** succeeded Mr. Wiesel as director of sales and **A. R. Olsen** is named manager of plastics promotion. Mr. Wiesel will devote his time primarily to promotion of the department's products into new fields.

Ernst R. Habicht has been appointed manager of Du Pont's Belle, W. Va., works, as an assistant production manager of the ammonia department with headquarters in Wil-

WORKS WHERE OTHERS WON'T

for
SUBMERGED
OILLESS
BEARINGS

SPECIFY
GRAPHALLOY
TRADE MARK REG. U. S. PAT. OFF.
WITH CONFIDENCE

- OPERATE DRY or SUBMERGED IN DYES, PLATING, CLEANING & CHEMICAL SOLUTIONS, GASOLINE, FOODSTUFFS
- TRULY OILLESS AND SELF-LUBRICATING
- EXTREMELY DURABLE
- CONSTANT COEFFICIENT OF FRICTION
- APPLICABLE OVER A WIDE TEMPERATURE RANGE—even where oil solidifies or carbonizes
- EXTENSIVELY USED IN CONVEYORS, PUMPS & OVENS
- ROTATING SEALS OF GRAPHALLOY ARE UNEXCELLED

GRAPHITE METALLIZING CORPORATION
1024 NEPPERHAN AVENUE, YONKERS 3, NEW YORK

mington, Del. The promotion of **Fred A. Otto**, from assistant manager to manager of the Belle works, and **John R. McConnell**, from production superintendent to assistant manager of the Belle works, has also been announced. **Edward C. Kirkpatrick** is the new assistant chemical director of the ammonia department.

Donald Delaney, formerly with the Atlantic Refining Co., Philadelphia, and previously with Du Pont, has joined Plaskon division of Libbey-Owens-Ford Glass Co. as assistant sales manager of coating resins.

D. Delaney

H. B. Kline

Hayden B. Kline, formerly executive vice president, has been made president and chief executive officer of Industrial Rayon Corp. He succeeded **H. S. Rivitz** who became chairman of the board on January 1.

Harlan N. Worthley, director of the agricultural and textile chemicals research department of Merck & Co., Inc., Rahway, N. J., has been appointed executive director of the Committee on Chemical Warfare of the Research and Development Board, National Military Establishment.

W. Robert Schwandt, who has been a chemical engineer in the development engineering department of A. E. Staley Mfg. Co. for the past three years, has been transferred to the industrial sales department. In his new position, Mr. Schwandt will act as technical sales representative to the paper industry for the Michigan-Wisconsin-Minnesota area.

F. H. Spedding, director of the Iowa State College Institute for Atomic Research was the first to receive a new "Iowa Medal" from the Iowa section of the American Chemical Society. Presentation was made December 3 at the university.

George C. Hargrove and **Ralph D. Waterman** were elected vice presidents of E. B. Badger & Sons Co., Boston, at a recent meeting of the board of directors. Mr. Hargrove

no
CHEMICAL
can
attack
TEFLON
PACKING
FOR PUMPS
AND VALVES

- *another example:*

"The Western Electric Company at Allentown Pa. has been using our Style #101 Plastic Teflon Packing on a Worthington 1CG1 Worthlite Pump handling saturated ethylene diamine tartrate solution since April 1948. No noticeable deterioration.

- *long life—low wear*

The coefficient of friction is so low that they have achieved essentially leak-proof operation."

- *what is it?*

No. 101 Plastic Teflon Packing is a non-porous packing having the 100% chemical resistance of pure Teflon. Thoroughly tested. Withstands temepratures from minus 80°F to 525°F. Style 201 same as 101, except mica is substituted for graphite. This style for stainless steel valves and pumps. We also make Teflon covered gaskets.

- *so . . .*

wherever, whenever you have a nasty packing or gasket problem, call on

POWER PRODUCTS CO.
11 Broadway, New York 4, N.Y.

Reducing Corrosion Pitting

Extending Condenser Tube Life By Keeping Tubes Free From Foreign Matter

Corrosion from the water side of Condenser and Heat Exchanger Tubing is one of the biggest problems of petroleum refining, petro-chemical and chemical processing plants, as well as for tankers carrying their products. Since corrosion pitting (deposit attack) is a frequent cause of tubing failure, this type of corrosion should be given special study.

Causes of Corrosion Pitting. In general, most of the trouble is caused by deposits in the Condenser and Heat Exchanger Tubing of such foreign matter as sand, sawdust, mud, stones, coal, coke, cinders, marine growth, rust, etc. The metal beneath or around the deposit of foreign substance or rust is comparatively rapidly attacked while the adjacent areas of metal, which have no deposit, are only slightly corroded. The continued accumulation of corrosion products from the destructive action which takes place on the tube wall helps to produce deeper pits or to enlarge the areas being corroded. Pitting perforates the tube wall within a *much shorter time* than the over-all corrosion rate would indicate.

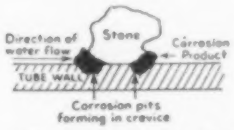


Figure 1. Diagram showing the result of deposit of solid, inert material on condenser tube wall.

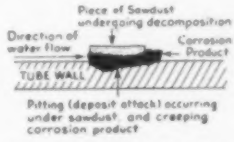

Piece of Sawdust undergoing decomposition
Direction of water flow
Corrosion Product
TUBE WALL
Pitting (deposit attack) occurring under sawdust, and creeping corrosion product

Figure 2. Diagram showing the result of a dirposit of porous material on condenser tube wall.

Effect of Solid Deposits. With such substances as shells, stones, coke, coal, etc., corrosion pitting generally does not take place directly beneath the object but rather in the crevices formed where the object comes in contact with the tube wall (see Figure 1). Symmetrical or irregular rings of corrosion pits are formed beneath a layer of corrosion product.

Effect of Porous Deposits. When porous deposits such as bits of wood, cloth, paper, decayed fish, marine growths, rust, etc., are in contact with the tube surface, corrosion pitting may take place quite uniformly beneath the deposit (see Figure 2). Under these conditions, high-zinc alloys, such as Muntz metal for example, may develop plug-type dezincification instead of pits filled with loose corrosion products.

Effect of Temperature and Water Composition. Generally, pitting is accelerated with higher temperatures of the tube wall. In some cases, as water temperature rises, bacterial activity increases, causing formation of such gases as hydrogen sulphide, ammonia, carbon dioxide, etc., which may also accelerate corrosion pitting.

Effect of Alloy Composition. No condenser tube alloy is immune to corrosion pitting. However, this type of corrosion is affected in some waters by alloy composition. For example, with Aluminum Bronze and Aluminum Brass, after pitting has progressed to a certain point, the attack, in some cases, seems to be stifled by the corrosion product developed in the corrosion pits. Cupro Nickel in clean sea water shows a tendency to form broad shallow pits rather than small deep ones.

An excellent example of premature failure caused by corrosion pitting of an otherwise sound condenser tube.

Preventive Measures. Wherever possible, foreign matter should be prevented from entering the condenser or heat exchanger. Baffles in intake tunnels are effective in preventing floating debris. Screens are desirable for keeping out stones, shells, cinders, wood, fish, seaweed, etc. Careful periodic cleaning by various mechanical and chemical procedures is helpful. Once pitting has begun, however, there is no certain method of arresting it. Therefore, it is of vital importance to carry out preventive measures faithfully in order to stop deposit attack from obtaining a foothold. Experience has shown that where tubes are kept clean, pitting can be reduced considerably and the life of tubing greatly lengthened.

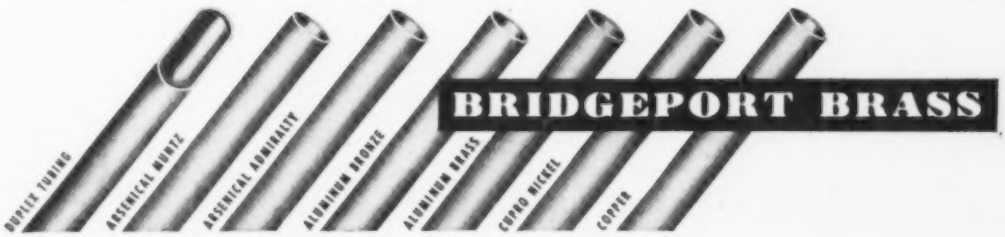
Condenser Tube Warehouse Stocks are carried in Los Angeles, San Francisco, and Houston for the convenience of our customers whose needs are so urgent that they cannot wait for mill shipments. Contact the nearest Bridgeport office for your tube requirements and for help in your corrosion problems. Our laboratory will gladly assist in the selection of the alloy which will serve best. Write for 120-page Condenser Tube Manual, containing much information on condenser and heat exchanger tube alloys and duplex tubing, their characteristics and applications.

• • •

"Bridgeport"

BRIDGEPORT BRASS COMPANY
BRIDGEPORT 2, CONN. • *Established 1865*
Mills at Bridgeport, Connecticut, and Indianapolis, Indiana
In Canada—Noranda Copper and Brass Limited, Montreal

CONDENSER AND HEAT EXCHANGER TUBING



Simplify your work with the

SECON
PRECIOUS METALS
WEIGHT CALCULATOR

It rapidly calculates the weight of:

PLATINUM
PALLADIUM
GOLD
SILVER

in the forms of:

Sheet • Wire • Tubing • Discs

- Operates like a slide rule.
- Gives answer in Troy ounces.
- Computes all sizes and thicknesses.
- Saves time and avoids errors.

Price: $5.00 complete with instructions

Write to:

SECON METALS CORPORATION
229 EAST 45th STREET
NEW YORK 17, N. Y.
Telephone: MUrray Hill 7-1594

SECON

Suppliers of
PLATINUM
METALS AND ALLOYS

ROTH
STAINLESS
PUMPS

Capacity 2 to 180 GPM
Head 0 to 400 Feet

Write for Bulletin 101

ROY E. ROTH COMPANY
2480 4th Ave.
Rock Island, Illinois

who has been with E. B. Badger & Sons for 18 years, a vice president in charge of general administration and sales. Mr. Waterman, who has been with the company for 9 years, is vice president in charge of engineering and construction.

Arthur W. Krause and **Alvin M. Cunningham** have joined the engineering division of the Gas Machinery Co., Cleveland.

H. P. Munger, for 19 years associated with the steel industry in product development and production work, has joined the staff of Battelle Institute, Columbus, Ohio, where he will be engaged in research in chemical engineering.

Robert H. Mosher, technical director of the Marvellum Co. of Holyoke has left that organization to join the Holyoke Card and Paper Co. of Springfield.

Francis P. Bluemmel has been appointed supervisor of process development in the vat color department of General Aniline & Film Corp., Grasselli, N. J.

Orest A. Meykar has opened an office in Long Island City, N. Y., to handle general engineering and production mechanization problems.

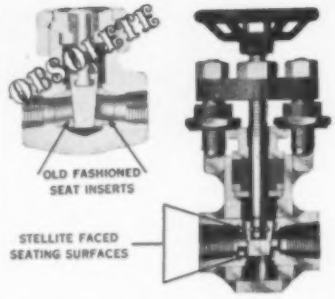
Frederick J. Pilgrim, who received his Ph.D. in organic chemistry from the University of Illinois in October, is now a member of the research staff of Chas. Pfizer & Co., Inc., Brooklyn.

Frederick L. Bissinger, secretary of Industrial Rayon Corp. since 1945, and head of its patent department since 1942, has been named vice president in charge of research.

Ford L. Wilkinson, Jr., dean of the United States Naval Postgraduate School, Annapolis, Md., has been appointed to the presidency of Rose Polytechnic Institute at Terre Haute, Ind., succeeding **Donald B. Prentice,** who retired in July.

Frank L. Couch, Jr., paper technologist, formerly with Monsanto Chemical Co., Everett, Mass., has joined the canister branch, protective division, technical command, Army Chemical Center, Md.

Frank Landee, who joined the staff of the chemical engineering department at the University of Southern California in 1947, has been named acting head of the University of Southern California in 1947, has



Hancock Design "obsoletes" seat inserts

SUPER-HARD *Stellite* faced seating surfaces in Hancock GateValves are integral with the WELDVALVE body. They never need to be replaced, and leakage between body and seat is impossible.

The Hancock technique of accurately finishing before assembly, assures perfect alignment with the "500 Brinell" stainless steel wedge, and results in complete absence of distortion inherent in screwed-in and spun-in seat designs.

Excess handwheel pressure to align seating surfaces is not necessary for WELDVALVE tightness. *Perfect* alignment guarantees tight valves even on the upstream side of the wedge.

Designed for 800# at 750°F or 2000# at 100°F. Sizes ¼" to 2" inclusive.

Stocked and sold by leading Distributors everywhere. Write them or us for details.

HANCOCK *Valves*
A Product of
MANNING, MAXWELL & MOORE, INC.
WATERTOWN 72, MASSACHUSETTS

Makers of Hancock Valves, Ashcroft Gauges, Consolidated Safety and Relief Valves and American Industrial Instruments

CHEMICO *has the experience in the design and construction of*
SYNTHETIC AMMONIA PLANTS

"There is no substitute for experience." That's particularly true when it comes to designing and constructing plants for the production of synthetic ammonia. For more than twenty years Chemico, utilizing the well known N. E. C. Process, has been the leading builder of this type of installation.

Today, Chemico helps in the fight to feed the world by designing and supervising the construction of complete plants for the production of nitrogenous fertilizer.

IN INDIA . . . 350,000 tons a year of ammonium sulfate will be produced by a plant at Sindri to be operated by the Indian government.

IN EGYPT . . . every day 550 tons of calcium nitrate will flow from the great plant at Suez . . . to be built for the Societe Egyptienne d'Engrais et d'Industrie Chimiques (S. A. E.).

IN MEXICO . . . 70,000 tons of low-cost ammonium sulfate will flow from a new plant near Mexico City to be built for Guanos y Fertilizantes S. A., Mexico's leading fertilizer manufacturer.

In other strategic places throughout the world—as well as in the United States—Chemico is helping to meet the need not only for fertilizer, but also for sulfuric acid, synthetic ammonia, synthetic methanol and other heavy chemicals.

In each of these projects the Chemico organization functions as Architect-Engineers in charge of design, procurement of equipment, supervision of construction, training of personnel and initial operation.

Chemico's extensive experience in these and hundreds of other installations is your guarantee of performance . . . your assurance of economical and efficient operation.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BUILDING, 350 FIFTH AVENUE, NEW YORK 1, N. Y.

European Technical Representative: Cyanamid Products, Ltd., Bretton Hall, Lancaster Place, London W. C. 2, England

European Licensee of N. E. C. Process: Hydro-Nitro S. A., 8 Quai du Cheval Blanc, Geneva, Switzerland

Cables: Chemiconst, New York

CHEMICO PLANTS ARE PROFITABLE INVESTMENTS

IT'S EASY
to remove TRAMP METAL
with HOMER PERMANENT
non-electric MAGNETIC
SEPARATORS

HOMER PERMANENT NON-ELECTRIC MAGNETIC SEPARATORS

The HOMER MANUFACTURING CO., Inc.
DEPT. C12 LIMA, OHIO
Pioneers of Magnetic Separator Equipment Since 1923

been named acting head of the department. He replaces **Herbert Waterman** who died last year. Professor Landee formerly was a junior executive with the Dow Chemical Co.

William F. Waldeck and **Harold R. Suter**, formerly chemical engineering supervisor and assistant to the vice president-research respectively, have been promoted to associate directors of research at Wyandotte Chemicals Corp. **Frederick Smith** has been appointed chemical engineering supervisor. **Howard W. Pearsall**, former chemistry instructor at Wayne University, has been appointed head of the department of technical information.

Oliver McClintock has been appointed assistant industrial manager of the Glidden Co., Cleveland. For the past 14 years, Mr. McClintock has served the M. B. Suydam division of the Pittsburgh Plate Glass Co.

O. McClintock

N. D. Embree

Norris D. Embree has been appointed director of research at Distillation Products, Inc. Dr. Embree has been acting research director since June 1.

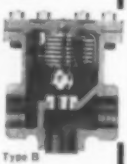
F. H. Reed, chief chemist of the Illinois State Geological Survey Division, has been sent to Japan by the U. S. Army on a scientific mission. The work is in cooperation with officials of the Economic and Scientific Section of General Headquarters to provide guidance to the Japanese in organizing a national coal and lignite program.

Wayne E. White, of the Ozark-Mahoning Co., Tulsa, has been elected chairman of the Tulsa section of the American Chemical Society. He assumed office on January 1, succeeding **Paul H. Cardwell**, chief chemist of Dowell Inc.

J. H. Bruun has been appointed director of the central research laboratory of General Aniline & Film Corp. Dr. Bruun will have charge not only of the work at General Aniline's central research laboratory in Easton, Pa., but will also direct

Does Dirt Plug YOUR Steam Traps?

Nicholson traps are self-cleaning because: (1) Valves are located at the bottom; dirt drops out by gravity. (2) The orifices are 2 to 6 times larger; chances of plugging are negligible.



Type B

Type AU

This ability to self-clean is one of the features resulting in the unequalled discharge capacity of Nicholson traps. 5 types for every purpose; size ⅛" to 2"; press. to 225 lbs. BULLETIN 1047.

Type AHV

W. H. NICHOLSON & CO.
206 Oregon St., Wilkes-Barre, Pa.

Lick CORROSION PROBLEMS

THIS POSITIVE, ECONOMICAL WAY!

If you've ever had equipment losses due to corrosion . . . if you've ever wanted a sure, economical way to solve corrosion problems . . . investigate HAVEG.

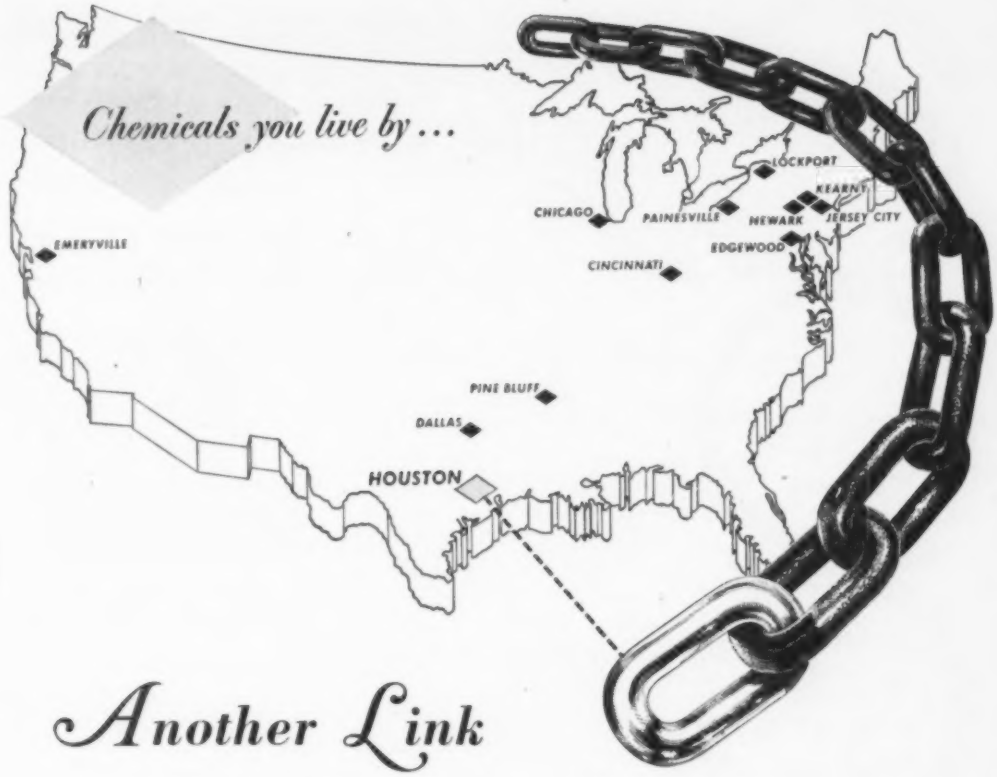
Here is a molded structural material that assures complete acid, alkali and solvent resistance *throughout its entire mass* . . . it is not just a lining or coating!

HAVEG equipment lasts longer . . . costs less. Its strength, toughness, and durability make it ideal for tanks, towers, coolers, piping, valves and similar applications. For *real* help in your fight against costly corrosion, investigate HAVEG, now.

Bulletin F-5 gives complete design, engineering and application data. Write for it today.

HA-S-48

HAVEG CORPORATION
NEWARK 8, DELAWARE



Another Link

... in Diamond's chain of plants to serve the chemical industry better

Add Houston, Texas, to your list of sources for chlorine and caustic soda. Diamond Alkali's newest plant, now in operation there, gives the chemical industry a greater and more flexible supply of these basic chemicals.

This is the latest link in Diamond Alkali's expanding chain of producing centers paralleling the country's industrial development. It is the 12th Diamond plant—and the fourth to produce both chlorine and caustic soda.

There are more than 100 Diamond products for the chemical industry. Back of them is an aggressive research organization.

If you are seeking a dependable source of supply for these products, or have a chemical problem in your business, won't you get in touch with us?

DIAMOND ALKALI COMPANY

Cleveland 14, Ohio

Diamond Sales Offices in Boston • New York • Philadelphia
Pittsburgh • Cleveland • Cincinnati • Memphis • Chicago
St. Louis • Wichita • Oklahoma City and Houston

DIAMOND ALKALI CHEMICALS

FORMALDEHYDE

for the
Chicago area . . .
. . . Great Lakes Region
and the
Middlewest

TANK CARS
and
DRUMS
made from our
own raw
material!

SPENCER
SPENCER
CHEMICAL
COMPANY
Executive and Sales Offices
Dwight Bldg., Kansas City 6, Mo.

CONTACT
SPENCER NOW
FOR 1949
CONTRACTS

the research activities in the various divisional laboratories of the company.

D. S. Davis, technical editor at the government laboratories, University of Akron, has assumed duties as professor of chemical engineering at the Virginia Polytechnic Institute, Blacksburg, Va.

Jesse I. Grant has returned to the Sterling-Winthrop Research Institute after a year's leave of absence to complete requirements for his M. D. degree at the University of Basle, Switzerland.

Henry H. Storch, chief of the research and development branch of the office of liquid synthetic fuels, United States Bureau of Mines, Bruceton, Pa., has been chosen as the 1948 recipient of the annual Pittsburgh award of the Pittsburgh section of the American Chemical Society. Dr. Storch, an authority on synthetic fuel processes and the chemistry of coal, received the bronze plaque at a dinner December 16.

Orville E. May has been elected vice president in charge of quality control of the Coca-Cola Co. He is credited with developing the deep tank mold fermentation process which now forms the basis for commercial production of penicillin and was director of the Northern Regional Research Laboratory, U. S. Department of Agriculture, Peoria, Ill., when that laboratory worked out the basic processes for mass production of penicillin.

Kenneth S. Pitzer, professor of chemistry at the University of California, Berkeley, has been appointed director of the Atomic Energy Commission's Division of Research.

William C. Dearing has resigned as research director of Plaskon division, Libbey-Owens-Ford Glass Co. to accept a similar post with the newly organized electro-textile division, Behr-Manning Corp., Troy, N. Y.

George Rieveschl, Jr., assistant director of chemical research of Parke, Davis & Co., has been elected chairman of the Detroit section of the American Chemical Society. He succeeds **Charles K. Hunt**.

Leonard C. Flowers, materials engineer of the Westinghouse Electric Corp., Springfield, Mass., has been elected chairman of the Connecticut Valley section of the American

Sutton, Steele & Steele
AIR TABLES
are more sensitive concentrators than any other type of gravity separators

You cannot use wet tables or use flotation reagents on half-inch particles . . .

you CAN use AIR TABLES.

You cannot separate by wet tables or flotation reagents round from flat particles . . .

You CAN with AIR TABLES.

You can't treat 5 to 8 tons per hour on a single unit of wet table or flotation cell . . .

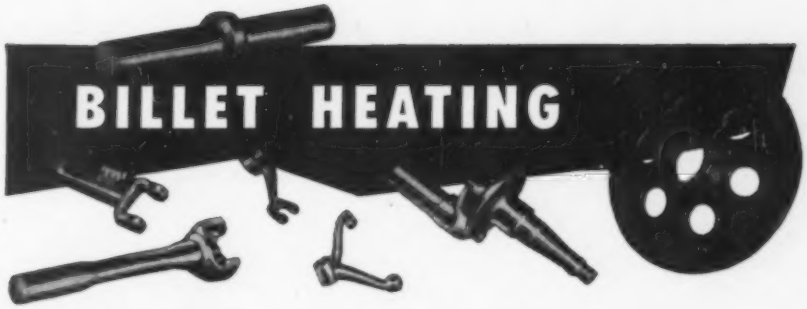
You CAN with an AIR TABLE.

You cannot size needle-like crystals with screens.

You CAN size such particles with an AIR TABLE.

Our engineers will be glad to help solve your separating or concentrating problems and submit recommendations. Send sample for laboratory tests.

SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
SALES OFFICES
Separations Engineering Corporation
710 EAST 42nd STREET, NEW YORK, N. Y.
OLIVER BUILDING, PITTSBURGH, PENNSYLVANIA
ENGINEERING BUILDING, CHICAGO, ILLINOIS
FLOUR EXCHANGE BUILDING
MINNEAPOLIS, MINNESOTA
41-43 DRUMM STREET
SAN FRANCISCO, CALIFORNIA
THE SS PROCESS FOR BETTER PRODUCTS—FASTER



Drop Forge Division Operations

WILLYS-OVERLAND MOTORS, INC.

Emphasize Speed of GAS

SPEED HEATING of small billets for drop forging demonstrates the speed of GAS for production-line operations requiring a flexible, controllable fuel.

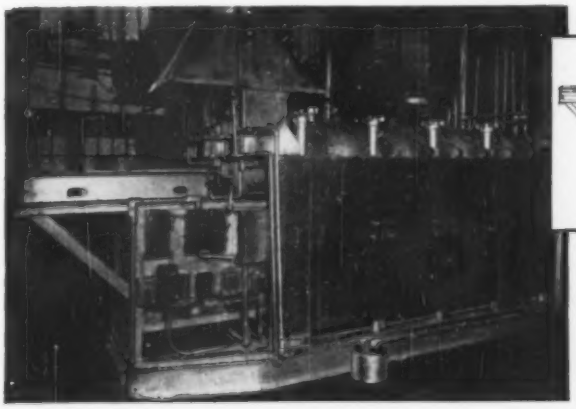
Drop Forge Division engineers and metallurgists, working with the furnace manufacturers, devised a simple Gas-fired, continuous-cycle billet furnace with the following characteristics and capabilities:

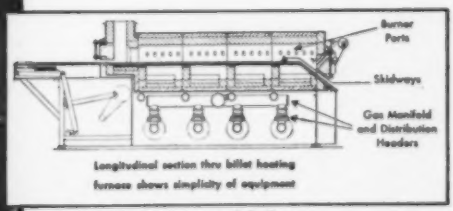
- **Billet Temperatures—2,200°-2,300°F**
- **Billet Heating Time—4 minutes normal (can be regulated as required in production schedules)**
- **Billet Discharge Rate—440 per hour, on 4-minute cycle**
- **Piece Dimensions (Average)—1"-2.5" thickness or diameter for rounds, squares, or flats up to 10" in length**
- **Furnace Heat-up Time—2,500°F in 15 minutes after initial lighting**

Quite as important as the productive capacity of the furnace are results of high-speed billet heating with GAS—

- **Uniform temperature of billets improves workability in forge**
- **Reduced scale minimizes abrasion in dies**
- **Flexibility for different sizes and shapes without costly equipment changes**
- **Economy of operation, of fuel costs, and of equipment investment**

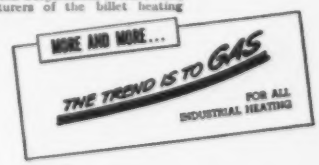
This application of modern Gas Equipment in an important production-line process is just one of the contributions made by GAS to industrial progress. There are many other heat-processing operations such as annealing, normalizing, stress-relieving, case-hardening, in which the productive flames of GAS have established records for productioneering. They're worth investigating.





Longitudinal section thru billet heating furnace shows simplicity of equipment

Section Drawing courtesy of Surface Combustion Corporation, Toledo, Ohio, manufacturers of the billet heating furnace.



AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE **NEW YORK 17, N. Y.**

Better Protection of Your Plant against CORROSION with

NUKEMITE

24, 35 & 40

In your plant the walls, floors, piping and structural members — tanks and other equipment — may be exposed to a continuing process of corrosion. Safeguard your plant investment — as many others are doing so successfully — with NUKEMITE.

NUKEMITE 24
A decorative coating for use where corrosive fumes or drippage prevail and ordinary oil-based coatings have proven unsatisfactory. No primer or basecoat needed. Easily applied by brush or spray method — no "curling" or "lifting" of paint surface beneath.

NUKEMITE 35
A heavy-viscosity solution which upon drying forms a dense, tough tank lining of unusual elasticity. Easily applied as a liquid coating with strong adhesive quality.

NUKEMITE 40
Protective coating for applications similar to those of *Nukemite 24*, but against conditions requiring greater corrosion and abrasive resistance. Specially recommended as a concrete-floor finish.

Write for the Nukemite Bulletin you need—today!

Nukem

NUKEM
PRODUCTS CORPORATION
98 Colgate Avenue
BUFFALO 20, N. Y.

Chemical Society. He succeeds **M. Gilbert Burford** of Wesleyan University.

Frederick G. Keyes, head of the department of chemistry, Massachusetts Institute of Technology, was awarded the ASME Medal on December 1.

Richard E. Chaddock has been named manager of Hercules Powder Co.'s sales research division. Dr. Chaddock succeeds **Carl W. Eurenius**, who has been named director of sales of the cellulose products department.

R. E. Chaddock

E. H. Volwiler

Ernest H. Volwiler, executive vice president of Abbott Laboratories, North Chicago, Ill., and a leader in the field of medicinal chemistry, has been chosen president-elect of the American Chemical Society.

Donald E. Pearson, assistant professor of organic chemistry at Vanderbilt University, has been elected chairman of the Nashville section of the American Chemical Society. He assumed office on January 1, succeeding **James K. Witt** of Madison, Tenn.

Malcolm Pirnie, consulting engineer and head of the firm of Malcolm Pirnie Engineers, has been named 1948 winner of the Hoover Medal, jointly awarded by four national engineering societies. The award is in special recognition of Mr. Pirnie's leadership in the formulation of a program sponsored by the Engineers Joint Council for the postwar industrial control of Germany and Japan.

Lee Van Horn has been appointed chief process engineer for Fluor Corp., Ltd., Los Angeles. He was formerly head of the engineering department of Filtrol Corp., Los Angeles.

E. J. Macfarlan, manager of the Du Pont finishes division plant at Fort Madison, Iowa, has been transferred to South San Francisco, Calif. **P. J. Griffin**, plant manager at South San Francisco, is now at Everett, Mass.

Cambridge
WOVEN WIRE BELTS MOVE

A Cambridge Drive Chain Belt gives fast, economical and safe handling of slab rubber through vulcanizing and cutting.

Combining motion and processing, Cambridge Woven Wire Conveyor Belts offer these solutions to materials handling problems.

Fast continuous production—improved, more uniform products—work area savings—reduced accidents from manual handling—PLUS reduced handling costs by freeing manual labor for other jobs.

Cambridge belts can be fabricated from any metal or alloy—to the mesh or weave that suits your requirements best.

FREE BOOK! "Woven Wire Conveyor Belts for Industrial Applications." 56 pages, illustrated. Describes Cambridge Belt construction and use. Write today for your free copy . . . or call the Cambridge office nearest you.

Cambridge
WIRE CLOTH CO.
Department G • Cambridge 1, Md.
BOSTON • NEW YORK • BALTIMORE
PITTSBURGH • DETROIT • ST. LOUIS
CHICAGO • SAN FRANCISCO • HOUSTON

DEOXO PURIFIERS
PROVIDE
OXYGEN FREE GASES
FOR

HEAT TREATING
ANNEALING
BRAZING
HYDROGENATION
SINTERING
SOLDERING

20,000 C.F.H. CAPACITY
DEOXO GAS PURIFIER

DEOXO GAS PURIFIERS provide a simple and dependable means for removing Oxygen or Hydrogen from such gases as Argon, Helium, Nitrogen, Hydrogen, Neon, Oxygen, Carbon Dioxide and Saturated Hydrocarbons.

MODERN CATALYTIC METHOD
OPERATE AT ROOM TEMPERATURE
REQUIRE NO POWER SUPPLY
NO MAINTENANCE OR UPKEEP EXPENSE
RESIDUAL IMPURITY LESS THAN ONE PART PER MILLION
STANDARD UNITS
5 c.f.h. to 100,000 c.f.h.

Deoxo Indicators for Continuous Measurement and Recording of Oxygen Concentration in Gases Are Also Available.

CATALOGUE AND COMPLETE INFORMATION ON REQUEST.

BAKER & CO. INC.

113 Astor St., Newark 5, N. J.

NEW YORK CHICAGO SAN FRANCISCO TORONTO

SPARKLER
horizontal plate
FILTERS

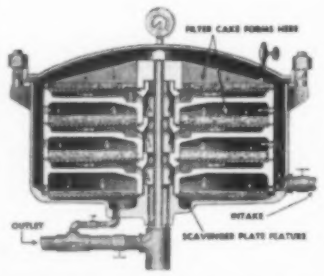
—preferred by many in chemical processing plants because of two outstanding features — uniform microscopic filtration — complete recovery of product.

Unlike the construction of some other types of filters the horizontal plates in the Sparkler allow the filter media to form in an even cake of uniform thickness, built up in a horizontal position without stress and therefore not subject to cracking or slipping under pressure, thus assuring uniform filtration either with intermittent or continuous flow.

Complete recovery of product is obtained by "wash through" or "blow down" of cake without removal from filter. The Sparkler scavenger plate, with independent control valve, acts as an auxiliary filter, filtering each batch down to the "last drop" leaving no holdover.

Plates are available in two thicknesses, deep plates for liquids carrying a large proportion of solids and shallow plates for polishing operations. When shallow plates can be used the filter area is increased within the same size tank.

This illustration shows a Sparkler filter installed in the plant of a large producer of insulating varnish. Standard models are available in capacities of 60 to 7,500 G.P.H.



We invite correspondence on your filtering problem. The service of our engineers with over twenty-five years of experience in specific fields is available.

SPARKLER MANUFACTURING COMPANY
Mundelein, Illinois

and **H. F. Bodin**, manager of the Everett plant, was transferred to Fort Madison.

William R. Dedert has been appointed to the new post of general superintendent, Victor Chemical Works. In this capacity he will be in charge of manufacturing operations at the Chicago Heights, Ill., and Nashville, Tenn., plants, and the company's newest plant at Morrisville, Pa. **Homer B. Terry**, formerly superintendent of the Nashville plant, succeeds Mr. Dedert as superintendent at Chicago Heights. **John A. Coben**, previously general foreman at the Nashville plants, succeeds Mr. Terry as superintendent at Nashville.

Marvin C. Jones has been appointed manager of Weyerhaeuser Timber Co.'s sulphate pulp and container board plant mill at Springfield, Ore.

Hubert Woods, research director of the Riverside Cement Co. of Los Angeles, Calif., has been chosen director of research for the Portland Cement Association.

Ralph N. Thompson, formerly chief chemist of the Falulah Paper Co., Fitchburg, Mass., has joined the research staff of Calgon, Inc., Pittsburgh.

OBITUARIES

Robert W. Pink, vice president of Cambridge Wire Cloth Co., Cambridge, Md., died November 23.

Eldon M. Eckhart, 52, executive vice president of the J. M. Huber Corp., New York, died suddenly at his home in Amarillo, Tex., on November 28.

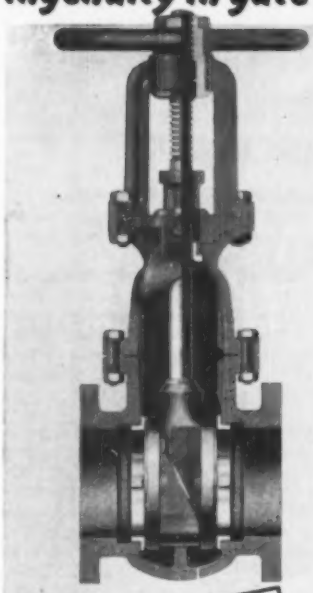
George W. Shores, 55, engineer in charge of Allis-Chalmers crusher sales section, died while in Oslo, Norway, November 29.

Charles Levis, 88, retired glass manufacturer, and father of William E. Levis, chairman of the board of Owens-Illinois Glass Co., died in St. Louis December 1.

Anderson W. Ralston, 49, assistant director of chemical research and development, Armour and Co., Chicago, died of a heart ailment on December 5.

Warren Neal Watson, 59, secretary of the Manufacturing Chemists' Association died in Washington December 9.

*Ingenuity in gate valve design fulfills seven objectives**



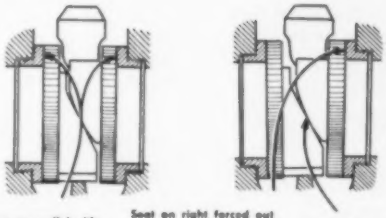
"This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:

- Positive, easy closing—regardless.
- Automatic adjustment for valve body distortion.
- Elimination of disc-to-seat friction and galling.
- Uniform wear distribution.
- Extreme simplicity.
- Greater service life.
- Simplified maintenance.

Darling Parallel Seat Gate Valves are available in a wide range of sizes and for all types of normal and unusual service, and for pressures up to 3000 pounds. Likewise, Darling Taper Seat, Solid or Slotted Wedge Gate Valves are available for most services.

Corrosion resistant valves. *In addition to conventional iron, bronze and steel types, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined, with special alloy trim; all bronze; and all special alloy. Darling's 60 years of experience in meeting unusual requirements is always at your service.*

AUTOMATIC ADJUSTMENT for valve body distortion



Discs line up parallel with seats when valve is new.

Seat on right forced out of line by body distortion but disc adapts itself to give positive closing.

Curved face of wedge allows discs to adjust lightly against both seats.

ALL valves regardless of size or construction are subject to body distortion—usually a continuous, although minute, process. The causes are many, including high temperature, high pressure, and line strains due to misalignment of piping. Whatever the cause, this distortion forces valve seats out of position and ordinarily means trouble . . . leaky valves, down-time, part replacements, and costly maintenance.

Now take a close look at the diagram above. Note how Darling's unique design automatically compensates for body distortion and the resulting misalignment of seats. The face of the upper wedge is radiused, while the adjacent side of the lower wedge is straight. Thus disc-to-seat pressure is always equalized, affording tight 360° seating despite horizontal or vertical changes in valve seat position.

So, for prolonged leak-free service, specify Darling Fully Revolving Double Disc Parallel Seat Gate Valves—the only valves embodying these design features.

DARLING VALVE & MANUFACTURING CO.
Williamsport 3, Pa.

Outline your needs and ask for specific data on the proper Darling Valves . . . or send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of *all* types and is full of valuable information.

THE VALVE MARK OF QUALITY . . . WATCH FOR IT

Better Designed

. . . MORE RUGGEDLY BUILT!

There are some mighty good reasons why so many cities and industries use Layne Well Water Systems exclusively. Two of these reasons are:—finer design for higher efficiency and extra rugged construction to assure longer life.

Every part of a Layne Well Water System is severely tested for accuracy, strength and quality. Where strain is heaviest, extra strength has been added. To excessive points there is more toughness.

All in all your Layne Well Water Systems are as fine as modern skill and advanced engineering can create. Their reputation for extraordinarily satisfactory service under any and all conditions is world known.

If you are in need of more water, a Layne engineer may be called in without cost or obligation. For literature address LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

LAYNE
WELL WATER SYSTEMS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City • Layne-Northwest Co., Lewiston, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific Inc., Seattle, Wash. • Layne-Texas Co., Houston, Texas • Layne-Western Co., Kansas City, Kans. • Layne-Minnesota Co., Minneapolis, Minn. • International Water Corporation, Pittsburgh, Pa. • International Water Supply Ltd., London, Ont., Can. • Layne Hispano Americana, S. A., Mexico, D. F.

INDUSTRIAL NOTES

Patterson Foundry & Machine Co., East Liverpool, Ohio, has appointed Joseph W. Kelley manager of the special equipment division.

Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has appointed E. V. Crane its chief engineer.

Speedways Conveyors (Canada) Ltd., has been organized to handle the manufacture and distribution of Speedways products in the Dominion of Canada.

Chain Belt Co., Milwaukee, has established a new warehouse in Atlanta, Ga.

Lincoln Electric Co., Cleveland, has appointed C. W. Lytton district manager in Buffalo, N. Y. C. M. Richardson has been made district manager for northwestern Pennsylvania.

Koppers Co., Pittsburgh, has made Carl H. Pottenger assistant sales manager of the chemical division.

Glidden Co., Cleveland, has honored R. H. Horsburgh with a testimonial luncheon. Mr. Horsburgh has retired as vice chairman of the board after 31 years with the company.

Sumner Chemical Co., New York, has added Lewis D. Williams to the staff of its New York office in a technical sales capacity.

Atlas Powder Co., Wilmington, has closed its coated fabrics division of its Zapon plant at Stamford, Conn.

McQuay, Inc., Minneapolis, has appointed Bernard M. Packtor, New Haven, Conn., as refrigeration representative in the New England states. Phillips-Fruth Co., will handle heating and air conditioning products in the Toledo area.

Naco Fertilizer Co. has purchased the plant of the American Agricultural Chemical Co. in Wilmington, N. C.

Allis-Chalmers, Milwaukee, has started production at the new soybean oils solvent extraction plant of West Tennessee Soya Mill at Tiptonville, Tenn.

Wyandotte Chemical Corp., Wyandotte, Mich., has reportedly bought a 100-acre site along Route 7, Bel-

Stainless Steel Piping Engineered And Pre-Fabricated

Fifteen years ago, we pioneered in developing methods for welding and shop pre-fabrication of stainless steel piping for one of the world's largest food canning companies. We've gained much experience since, and today, we use the latest "inert-gas-shielded-arc" welding, which has only been available for commercial use since the war. The illustration gives some idea of "what-we-can-do" in stainless. Insides of welds and joints can be made absolutely smooth. Our experience in power and process piping dates back forty-eight years and today most utilities and large industrial plants know the perfection of our patented Westport Welded Joint and other high pressure, high temperature pipe engineering and pre-fabrication. Write us, or send us prints for an estimate.

WESTPORT JOINT

REPRESENTATIVES IN BOSTON, NEW YORK, CLEVELAND, MOBILE AND HAVANA

W. S. MITCHELL & CO., INC.
7940 ELLSWORTH STREET
PHILADELPHIA 48, PA.

MITCHELL

PIPING FABRICATORS AND CONTRACTORS

NATIONAL AIROIL FUEL OIL · GAS BURNERS

THE RIGHT BURNER

OR COMBINATION FUEL OIL – GAS BURNERS FOR *YOUR NEEDS*

The factory, salesrooms and general offices of National Airoil Burner Company, Incorporated, are housed in this modern daylight plant at "L" Street, Sedgley Avenue and Pennsylvania Railroad, in the great Northeast industrial section of Philadelphia.

TYPE "SA"
Uses steam or compressed air for atomization. Thoroughly atomizes and completely burns the lowest and cheapest grades of fuel oil and tars. Requires only low oil pressure and temperature.

TYPE "SAL"
Large capacity burner of steam atomizing type. Adaptable to large boilers or dual fuel systems. Is frequently used for firing boilers above existing coal grates.

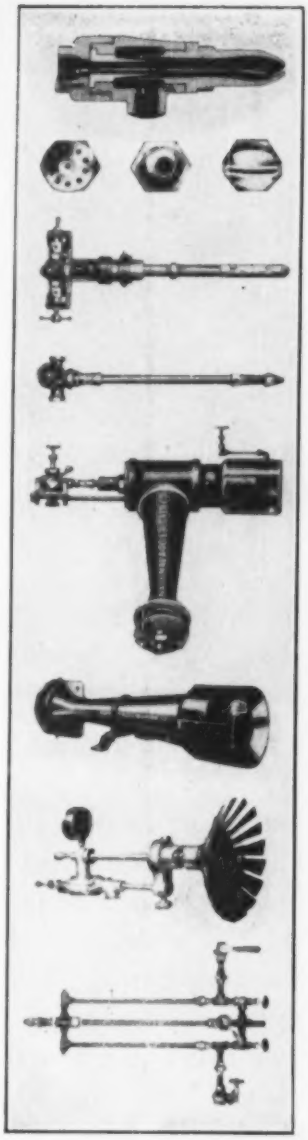
TYPE "SAR"
(Where steam, or gas is available for atomizing) safely and efficiently burns residuums obtained from process.

COMBINATION GAS AND OIL BURNERS
An "Airocool" Gas Burner in combination with a Type "SAR" Steam Atomizing Oil Burner. Type "SAR," safely and efficiently burns residuums obtained from process.

"AIROCOOL" GAS BURNER
Venturi type, Patented, long-life "Airocool" Nozzle assures trouble-free operation and provides low turndown without burnback.

MECHANICAL—PRESSURE ATOMIZING OIL BURNER
with multi-vane type air diffuser to give a positive swirl to entering combustion air.

TYPE "S-A-D"
(Refuse Oil Burner) burns acids or caustic oils, sludges, asphalts, tank bottoms, polymer oils, heavy petrolatum, organic oil residuums, waste cutting oils, sulphite pulp liquors in combination with fuel oil.



Whether you burn oil, gas or a combination of these fuels, there's a NATIONAL AIROIL BURNER for your job.

Our more than 36 years' experience in the design, development and manufacture of all types of industrial burners is at your service.

Ask us about your requirements . . . we'll gladly give you full information.

NATIONAL AIROIL BURNER CO., INC.

Main Offices & Factory: 1235 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.
Texas Office: 2512 South Boulevard, Houston 6

INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

• Many THINK their cost of handling chemicals, grains and granular material is low only to learn that a considerable saving can be made. DRACCO Pneumatic Conveyors reduce handling costs in so many ways in addition to saving labor, that substantial savings are made in most installations. Handling cost is a vital factor and should be reduced to the minimum. Why not find out how your costs compare with others? DRACCO Engineers have over 30 years experience analyzing handling problems of every description. Why not consult them?

For Further Information Write

DRACCO CORPORATION

4071 E. 116th St., Cleveland 5, Ohio New York Office: 130 W. 42nd St.

DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

mont County, Ohio. The site is located on a salt brine vein and the company will probably erect a chemical plant there.

Merck & Co., Inc., Rahway, N. J., has appointed Frank M. Parker manager of the general sales department.

St. Regis Paper Co., New York, has sold $10 million of 15-year 3¾ percent debentures at par to six insurance companies.

Alloy Steel Products Co., Linden, N. J., has appointed H. E. Johnson sales manager of the Chicago office.

Monsanto Chemical Co., St. Louis, has named Edward J. Bock plant manager at Monsanto, Tenn.

Texas Co., New York, has made F. C. Sealey assistant to the vice president. W. H. Farrand succeeds Sealey as general manager of the foreign producing department. J. P. McCulloch has been named assistant general manager and W. A. Clark has become manager (operations).

American C.E.C.A. Corp. has moved its headquarters to 23 West 45th St., New York.

Kieley & Mueller, Ridgewood, N. J., has made Al Bailey general manager.

Claude B. Schneible Co., Detroit, has appointed the Engineering Service Co., Newark, N. J., as its representative in northeastern New Jersey.

Rumford Co., Rumford, R. I., has elected Simon Askin director.

Witco Chemical Co., New York, has appointed Benjamin W. Lewis vice president in charge of western sales of the manufactured products division.

Jessop Steel International Corp., New York, has elected Howard M. Dawson president.

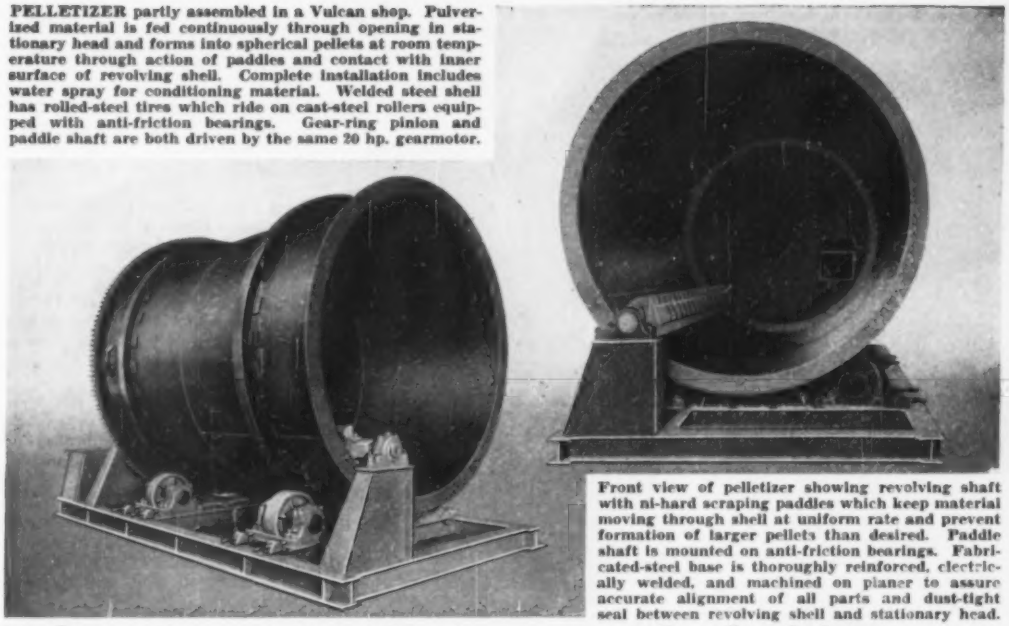
Continental Can Co., New York, has made J. E. Niederhauser vice president in charge of industrial relations.

Mathieson Chemical Corp., New York, has added Henry Gifford to its heavy chemical sales division with headquarters in Chattanooga.

Owens-Illinois Glass Co., Toledo, has appointed Jack M. McCullough manager of premium sales for Libbey glass division.

Libbey-Owens-Ford Glass Co., Toledo, has appointed Charles L. Neely sales manager of glues and industrial resins

PELLETIZER partly assembled in a Vulcan shop. Pulverized material is fed continuously through opening in stationary head and forms into spherical pellets at room temperature through action of paddles and contact with inner surface of revolving shell. Complete installation includes water spray for conditioning material. Welded steel shell has rolled-steel tires which ride on cast-steel rollers equipped with anti-friction bearings. Gear-ring pinion and paddle shaft are both driven by the same 20 hp. gearmotor.



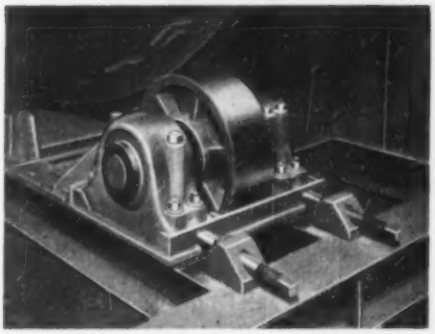
Front view of pelletizer showing revolving shaft with ni-hard scraping paddles which keep material moving through shell at uniform rate and prevent formation of larger pellets than desired. Paddle shaft is mounted on anti-friction bearings. Fabricated-steel base is thoroughly reinforced, electrically welded, and machined on planer to assure accurate alignment of all parts and dust-tight seal between revolving shell and stationary head.

Vulcan Processing Equipment is backed by a
HUNDRED YEARS
of Successful Manufacturing Experience

Established in 1849 the Vulcan Iron Works has grown steadily larger and stronger during its first hundred years of dependable service to users of heavy industrial machinery. Any machine or any part of a machine, built by Vulcan during that long period of time can be duplicated on demand—usually with very little delay.

For more than half a century we have been furnishing a constantly increasing variety of Rotary Kilns, Coolers, Dryers, Retorts, Roasters, Nodulizers, etc., to the chemical processing, rock products and metallurgical industries. In practically all cases these various types of rotary cylinders are designed and built especially to meet the purchaser's requirements and the "Pelletizer" here illustrated and described is an example of the excellent results secured through cooperation between Vulcan engineers and the purchaser's engineers or production executives.

Write us regarding any processing requirement to which a rotary cylinder of any size or type might be applied. Our engineers welcome opportunities to make helpful suggestions, whenever possible, without charge or obligation.



Close-up of supporting roller with anti-friction bearings. Entire assembly is mounted on a welded-steel sub-base which assures perfect alignment of shaft and bearings at all times and simplifies action of adjusting screws.

Vulcan Iron Works

Established 1849

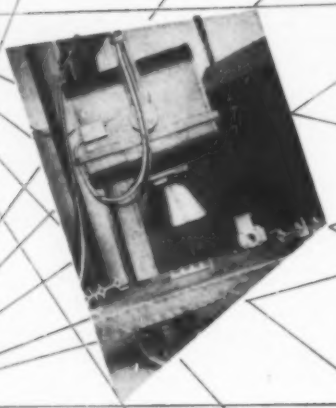
WILKES-BARRE, PA., U.S.A.

Cable Address "Vulworks Wilkes-Barre"

Other Vulcan Products include Industrial Locomotives, Electric Hoists, Mining Machinery, Sugar-Mill Machinery, Heavy Special Machinery

DURALOY

High Alloy CASTINGS



X-rayed by 250,000 Volts

...And we also have Gamma-ray inspection of castings!

Working on the theory that the production of sound high alloy castings calls for more than metallurgical and foundry skill, we have carried out a modernization program in our shop to make it "the last word" in chrome-iron and chrome-nickel production facilities.

Complementing the X-ray and Gamma-ray inspection facilities, we have seven of the latest type electric furnaces (5 arc-type and 2 high frequency type) with capacities ranging from 100 to 6500 pounds per furnace. We have sand-control and sand-treating apparatus. We have one of the best control and analytical laboratories in the industry.

Send for our General Catalog 4729-G

If you would like to have your chrome-iron or chrome-nickel castings made in our modern well-equipped foundry by experienced metallurgists and skilled foundrymen, we shall be glad to take care of your order.

THE DURALOY COMPANY

Office and Plant: Scottdale, Pa. • Executive Office: 32 East 41st Street, New York 17, N. Y.

Los Angeles & San Francisco: KELSEY & HARMON

Detroit: F. D. O'CONNELL & ASSOCIATES

for the Plaskon division. Donald Delaney has been made assistant sales manager of coating resins.

Pettibone Mulliken Corp., Chicago, has named W. E. Madden vice president of its subsidiary, George Haiss Mfg. Co.

United States Rubber Co., New York, has appointed Glenn T. Welton manager of distributor sales for coated fabrics.

Esso Standard Oil Co., New York, has appointed W. H. Peterson manager of the Chicago office of its chemical marketing affiliate, Enjay Co.

Midvale Co., Philadelphia, has appointed John C. Riley Co., Houston, Tex., as its district sales representative in the states of Louisiana, Arkansas, Oklahoma and Texas.

Eagle-Picher Sales Co., Cincinnati, has named Frank E. Huggins to represent its industrial insulation division in Cleveland and Detroit and surrounding areas.

Metalsalts Corp., Hawthorne, N. J., has taken over production of various organic mercurials from the Edwal Laboratories.

Interlake Chemical Corp., Cleveland, has promoted Myron T. Bennett to vice president in charge of sales, with headquarters at the firm's home office in Cleveland, Ohio.

Devoe & Raynolds Co., Inc., New York, has made Andrew W. Bornhauser and Clarence W. Slocum vice presidents.

Pesticide Advisory Service has been established by Melvin Goldberg in New York.

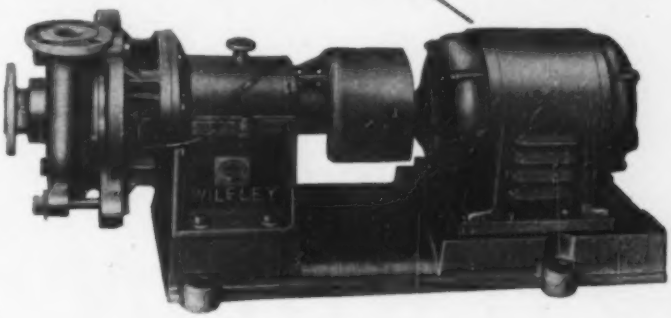
Koppers Co., Pittsburgh, has appointed W. Reed Morris eastern representative for the entire organization.

Spencer Chemical Co., Kansas City, Mo., has added Louis L. Ward to its chemical sales staff.

Leland Electric Co., Dayton, Ohio, has appointed P. J. Ganley vice president in charge of sales. J. G. Hiatt has been made district manager in Milwaukee.

Glidden Co., Cleveland, has promoted James C. Rankin to the post of executive assistant.

American Iron and Steel Institute, New York, has reported alloy steel production in the first ten months of



for ACIDS

This is the dependable, modern acid pump that eliminates trouble in chemical production. It handles acids, corrosives, hot liquids, and mild abrasives with cost-saving efficiency. You can count on it 24 hours a day, month after month without attention. 10-to 2,000-G.P.M. capacities; 15-to 150-feet heads and higher. Individual engineering on every application. WILFLEY is the pump to buy when you want dependability PLUS lower operating costs. Write or wire for complete details.

WILFLEY centrifugal PUMPS

A. R. WILFLEY & SONS, INC.

DENVER, COLORADO, U.S.A.

New York Office: 1775 Broadway, New York City

Throughout the Chemical Industry—

Aerofin units do the job Better, Faster, Cheaper

...AND HERE'S THE STORY ON

AEROFIN

This air-pressure test is one of many tests used to control the quality of Aerofin finned heat-transfer surface. If no bubbles appear in the specially illuminated tank, it means the immersed Aerofin unit has withstood the terrific strains of steam and hydrostatic pressure tests and is ready to give you long, efficient service.

Rigid specifications and inspection, backed by more than 25 years of experience in manufacturing finned heat-transfer surface, assure you of Aerofin dependability, durability and maximum efficiency.

Aerofin is devoted exclusively to the production of finned heat-transfer surface. This specialization enables Aerofin to select just the right surface and materials for the job, and to assemble these materials into a highly efficient unit.

Day after day, thousands of Aerofin Finned Heat-Transfer Units demonstrate their superiority under the most severe conditions. Complete research has developed accurate ratings which allow you to install Aerofin at full rated capacity with confidence.

AEROFIN CORPORATION
410 South Geddes St.
Syracuse 4, N. Y.

NEW YORK • CHICAGO • CLEVELAND • DETROIT • PHILADELPHIA • DALLAS • MONTREAL

1948 to equal nearly 10 percent of total output of ingots and steel for castings and to amount to nearly 7 million net tons, or 909,000 tons more than in the similar 1947 period.

Paisley Products, Inc., New York has purchased the Park Leggett Altman Co., Minneapolis.

Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has added Lionel Tinfow, a sales engineer, to its New York branch office.

Ferro Chemical Corp., Cleveland, Ohio, has installed new company officers. They are: C. D. Clawson, president; F. S. Markert, executive vice president; G. W. Wallace, treasurer; S. B. Elliott, assistant to the president; D. L. Cable, vice president.

Pemco Corp., Baltimore, has completed a new $50,000 research and development laboratory.

Western Supply Co., Tulsa, has appointed Willard A. Emery as its new works manager.

International Minerals & Chemical Corp., Chicago, has reelected all officers of the company.

American Car and Foundry Co., New York, has appointed G. L. Holt assistant district manager of the Madison, Ill., plant.

Wm. Powell Co., Cincinnati, has appointed Joe L. Comer as vice president in charge of sales in the New York area.

Mixing Equipment Co., Rochester, N. Y., has appointed the O'Neill Pump and Engineering Co. of Richmond as their Virginia representative.

United States Testing Co., Inc., Hoboken, N. J., has named William Furber Smith to organize a new engineering inspection service in conjunction with building and building material.

Jessop Steel Co., Washington, Pa., has appointed E. E. Bradberry assistant manager of sales in Chicago.

International Minerals & Chemical Corp. has appointed Ben E. Meguschar assistant to the vice president of the plant food division. Joe F. Stough has been made northern general manager of the division.

Hinde & Dauch Paper Co., Richmond, Va., has purchased land on Petersburg Pike for the construction of a new corrugated box factory.

DESIGNED
for Easier Cleaning

ADAMS
STAINLESS and NICKEL
FILTERS

CRYSTAL CLEAR FILTRATION
at Lower Operating Costs

1 **STAINLESS, NICKEL AND OTHER LININGS**... to suit your individual filtering requirements.

2 **FILTERED CONTACT SURFACE LINED** for special service where only filtered liquor requires protection.

3 **DISHED TUBE SHEET** assists in the removal of collected solids when backwashing and maintains a clean shell.

4 **TOTALLY ENCLOSED**... particularly suitable in filtering hazardous liquids as dismantling for cleaning is not required.

5 **COMPLETE LIQUID RECOVERY**...Valuable liquids can be filtered completely and withdrawn through the bottom outlet before cleaning.

6 **CLEANED BY BACKWASHING...SURGE TANK METHOD** requires only a few minutes to release backwash liquid under air pressure.

7 **NO MOVING PARTS**... reduces operating and maintenance expense to a minimum.

USING **PORO-STONE**

PORO-CARBON

PORO-SCREEN FILTER MEDIA

1 **INERT**... Resists action of acids and alkalies.

2 **PERMANENT**... Eliminates filter medium replacement.

3 **RIGID**... Permits pressure filtration and backwashing.

4 **HIGH DEGREE FILTRATION**... Obtainable in various porosities.

Write Today **FOR MORE DETAILS . . . CVF BULLETIN**

R. P. ADAMS CO., INC. [illegible] Representation in Principal Cities of United States and Canada

Reducing Agents

"Virginia" offers, in abundant supply, three reducing agents of wide and varied application in industry—Sulfur Dioxide (SO_2); Sodium Hydrosulphite ($Na_2S_2O_4$); and Zinc Hydrosulphite (ZnS_2O_4). Liquid Sulfur Dioxide is widely used in agriculture and metallurgy, and in the chemical manufacturing, food, glass, glue and gelatine, paint and varnish, pulp and paper, oil refining, sugar, tanning, and textile industries. Powerful Sodium Hydrosulphite is a "must" in the dyeing of textile fabrics and is also used by the glue, pulp, pigment, and chemical industries. High-test "Virginia" Zinc Hydrosulphite is made expressly for pulp and paper manufacture, but is also favored in the food, pigment, and mining fields.

For descriptive literature on these three outstanding "Virginia" reducing agents, write Virginia Smelting Company, Box 21, West Norfolk, Virginia.

VIRGINIA Chemicals
Established 1898

WEST NORFOLK • NEW YORK • BOSTON • DETROIT

50 YEARS OF SERVICE TO INDUSTRY

FERTILIZER FROM NATURAL GAS

We Design Construct Operate

FACILITIES FOR PRODUCTION OF AMMONIA DERIVATIVES FOR HIGH NITROGEN CONTENT FERTILIZERS

Pilas Mason Company

500 FIFTH AVE., NEW YORK
BOX 7162, SHREVEPORT, LOUISIANA

CONVENTION PAPER ABSTRACTS

Water Problems 264
Putting Research to Work 266
Nuclear Process Industry 268
Rail Fuel Efficiency 270
Plant Growth Chemicals 272
Fluophosphate Chemicals 273
Rubber Processing 275
Reclaim Improves Rubber 275
Synthetic Rubber Forecast 276
Fluorocarbon Plastic 278
Consultants Abroad 280
Column Efficiency 282
French Business Outlook 284
Managements Hopes 286

WATER SUPPLY

Water Quality Problems In Southern California

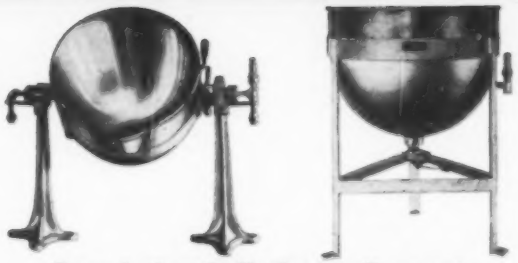
R. F. Goudey

SOUTHERN California has been too busy obtaining an adequate quantity of water to pay too much attention to the quality. Because of heavy overdraft, the Los Angeles River basin presents a unique history of water quality changes of large magnitude. In the northwest portion of the San Fernando Valley, the water is high in gypsum and has a hardness of 1,000 ppm. In the easterly portion of the valley, the soil is granitic and the hardness is 170 ppm. Several cities divert this good water; but Los Angeles, the rightful owner, gets a blend averaging 300 ppm. in hardness. In years past the Los Angeles River ground water became harder, and reached 600-700 ppm. at one point. Then as it percolated through humate and tannate beds a base exchange took place in which the hardness was lowered to 50 ppm., but the total solids remained about the same with a high increase in the sodium ratio.

Construction of flood control works, importation of Owens Valley water for spreading in the San Fernando Valley, extensive irrigation and fertilization in the San Fernando Valley have caused wide fluctuation, but the net change has been to increase the sodium ratio. During the war over 100 cfs. of industrial wastes was discharged into the Los Angeles River

FOR EVERY PROCESSING NEED

LEE Kettles WHERE CORROSION-RESISTANT EQUIPMENT IS NEEDED



Descriptive Bulletins on Request

LEE METAL PRODUCTS CO. INC.
417 PINE STREET . . . PHILIPSBURG, PA.
ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

DIAGNOSTIC SPECIALISTS FOR

Industrial Construction

The smart businessman doesn't rely on guess work to avoid headaches; he consults a skilled diagnostician and prevents ills before they begin.

Brown & Root's world-wide achievements in such fields as chemical, petroleum and petro-chemical construction and design make it possible for you to draw on a virtual gold mine of experience. In related fields this experience may provide ideas for reducing capital investments and operating costs and increasing the quality of your product.

At your invitation one of our specialists will call on you to discuss your construction and expansion problems. There is no obligation involved.

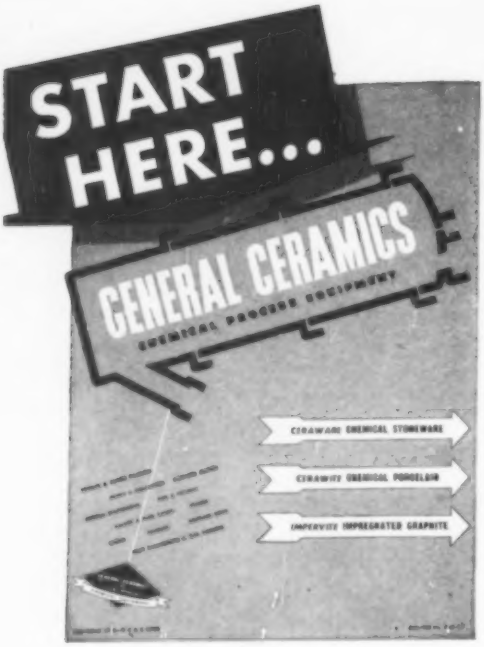
BROWN-BILT

BROWN & ROOT, Inc. *Engineers & Constructors*

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.



TO STOP CORROSION

If corrosion is your problem in processing muriatic, sulphuric or nitric acids, hydrogen peroxide or any other strong corrosive agent, you'll want to know all about General Ceramic's complete line of equipment, scientifically designed for corrosion-proof handling and storage of chemicals.

Graphically illustrated in brand new Bulletin No. CHE-R3, is G.C.'s answer to your corrosion problems—full specifications on stoneware (Ceraware), porcelain (Cerawite) and graphite (Impervite) . . . pipe and fittings, plug cocks, filters, pumps, tanks and storage vessels, kettles, towers, sinks, plate and heat exchangers, as well as G. C.—designed processing systems.

Write today for your copy of Bulletin No. CHE-R3—let General Ceramics apply its long years of experience in overcoming chemical corrosion to the design, layout and selection of equipment to solve your problem.

YOU SAVE 3 WAYS WITH GENERAL CERAMICS' $$$*

Savings through uniformity of construction . . . no misfits.
Savings on shipping costs . . . one shipment for everything.
Savings on paper work, accounting . . . one order, one bill.

General Ceramics AND STEATITE CORP.
CHEMICAL EQUIPMENT DIVISION
13 Crows Mill Road — Keasbey, New Jersey

[Sales Offices in: BUFFALO, CHICAGO, LOS ANGELES, PITTSBURGH, PORTLAND, ORE., SAN FRANCISCO, SEATTLE, TACOMA, MONTREAL, TORONTO, VANCOUVER, B. C.]

Facilities of our Insulator Division are available for electronic and other small part applications of ceramic products.

*Single Source of Supply. 4900

or its margins which locally caused some undesirable pollution.

Underground water from the San Gabriel River has the best quality of any water in the area. It should be reserved for industry, but is being wasted for agricultural and fish hatchery use. The Santa Ana basin is one of the most intensively exploited basins in the West, some of the water passing through 13 cycles of reuse. Much of its water is spoiled by natural means.

Industry which can locate outside the metropolitan district would do well to reclaim water from sewage. This affords a cheap water supply of superior mineral quality over and above that used in the city of Los Angeles and in the harbor district. Why should water be imported hundreds of miles and after a little spoiling be wasted into the ocean? This solution involves legal and technical problems but they are of no greater magnitude than have already been faced.

R. F. Goudey, consulting engineer, before Southern California Section, American Chemical Society, Los Angeles, Nov. 5, 1948.

MANAGEMENT

Putting Research Results to Work

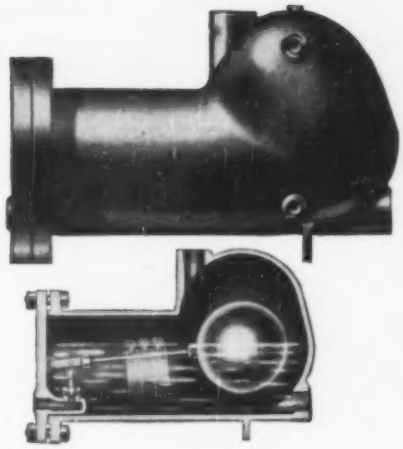
Paul D. V. Manning

During the past three decades, both the methods of carrying out industrial research and its administration have undergone considerable change.

As industry grew, it was quick to recognize the possibility of return on the research dollar investment. The fields became more crowded and in typical American fashion, the industrialists began to try to speed up and intensify the entire process of research. This was accomplished by putting teams of specialists cooperatively to work on each problem. Viewed broadly, each research problem today almost always requires the chemist, physicist, biologist, and engineer for the research itself even before the beginning of the industrial exploitation of results. Research is a very objective endeavor and it is now usually difficult to keep the difficulties of subjective personalities from impeding the progress of the work.

It is when the process of "industrializing the results" of research begins, that the real business risk starts. At this stage opportunities can be lost easily or business enterprises made. This is always more costly of time, effort and money than the research itself.

The major essentials required be-



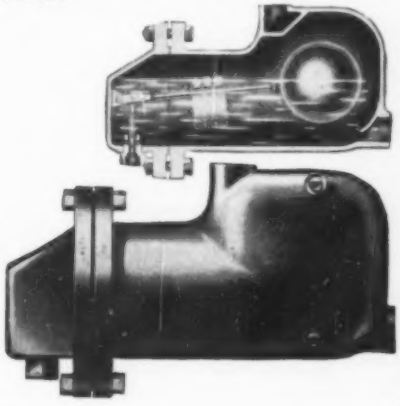
TYPE 90—For Pressures Up to 500 psi.

Semi-steel or cast steel bodies. Eight inch float. For pressures up to 500 psi. Removable orifices are available, to offset limitations of float power and buoyancy. Finely engineered for long life, accurate service.

Climax Drainers serve as steam traps on fractionators, reboilers, kettles and other equipment using steam for heating and where continuous condensate elimination is necessary for accurate temperature control. Use as an air, gas or vapor eliminator from pressure system when inverted. For water trays of distillation columns, drainers for reflux accumulators and other services, a weighted float arm is available to cause float to sink in liquids of higher gravity than 40° API (.825 sp. g.) and float on water.

TYPE 140—For Higher Pressures

Eight-inch float. Accurate, dependable service at pressures up to 600 psi. Ideal for high gravity liquids, corrosive liquids . . . Climax has eliminated stuffing box. Single needle type inner valve seat gives positive shut-off. Head flange construction in accordance ASA code.



Climax Engineering Co. Controls Division

Need Help in Providing CONTINUOUS ELIMINATION of Water, Oils, Condensate from Pressure Systems?

call for

climax DRAINERS

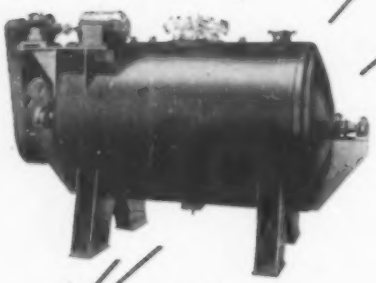
WRITE TODAY FOR CATALOG

All the information about Climax Drainers . . . charts, diagrams, performance figures, full description of all types.

CLIMAX ENGINEERING CO.
CONTROLS DIVISION
15 N. CINCINNATI TULSA, OKLA.

I·P·E MIXERS

"Standard-Plus" Units expertly engineered to your mixing needs.



I*P*E HORIZONTAL MIXER with double ribbon agitator.

I*P*E "Standard-Plus" Mixer Line

BATCH AND CONTINUOUS LIQUID MIXERS
★
REDUCING MIXERS
★
HORIZONTAL DRY OR WET MIXERS
★
PASTE MIXERS
★
PAINT MIXERS
★
DOUGH MIXERS
★
CONICAL DRY MIXERS

I*P*E "Standard-Plus" Mixers are a step beyond the standard line of mixers. For "Plus" value, they embody added features to meet individual mixing needs. Every I*P*E Mixer is functionally "tailor made" for exacting requirements.

The units combine the results of wide experience of I*P*E's engineers in the process industries with sound engineering, expert design and precision manufacturing.

Whether your mixing problem calls for the blending of liquids, liquids and solids, slurries, pastes, plastics, doughs and dry powders, you will find an I*P*E model that will do the job for you as you want it done.

*For every I*P*E "Standard-Plus" Mixer, special consideration is given to the best type and speed of agitation.*

*Other I*P*E "Standard-Plus" Processing Equipment* – Kettles • reactors dissolvers • stills • crutchers • extruders • nitrators • sulfonators crystallizers • all types of agitators • pony mixers • change can mixers

SPECIAL UNITS AND COMPLETE PLANTS

I*P*E staff of process plant engineers and designers welcome your inquiry for special needs. No obligation.

Send for our complete catalogue

INDUSTRIAL PROCESS ENGINEERS

ENGINEERS
DESIGNERS
MANUFACTURERS

2 LISTER AVE., NEWARK, N. J.

Branch Offices: Chicago, Cincinnati, Pittsburgh, St. Louis

fore an enterprise can be brought to business success are:

1. Good management.
2. A product that is the equal or better than anything on the market.
3. Either a market that exists or one that can be created.
4. Sufficient capital to carry the enterprise during this period.
5. A potential competitive position which can be maintained satisfactorily by reason of the cost of manufacture.
6. Continuously satisfactory sources of raw material.
7. Satisfactory means of producing the product. This includes both a process and plant.
8. Research and development for the purpose of continuously maintaining and improving the position in the field, once it is attained.
9. Satisfactory personnel for the entire enterprise.

Each of these essentials is so important, that it is hardly possible to assign a preferred position to any one of them. The failure or lack of one of these factors will result in the failure of the entire enterprise, either during its development or shortly after it gets under way.

From a cursory study of this listing of essentials, it is immediately apparent that many specialists are involved. Just as the research project itself requires a team made up of experts of different fields of science, putting the results to work requires the coordinated efforts of a much greater number of those of specialized training and experience in many broad fields.

P. D. V. Manning, International Minerals & Chemical Corp., before Chicago Chemical Exposition Panel on Utilization of Research Results, Chicago, Oct. 14, 1948.

NUCLEONICS

Nuclear Process Industry

Walter DeCew

THE federal government's investment in laboratories and fissionable material production plants is now over $3 billion, and this investment is being operated at a cost of nearly $1 billion per year. About 80 percent of this investment is devoted to the production of fissionable material for bombs. The remaining 20 percent, roughly, is allotted to fundamental research, and research on nuclear power.

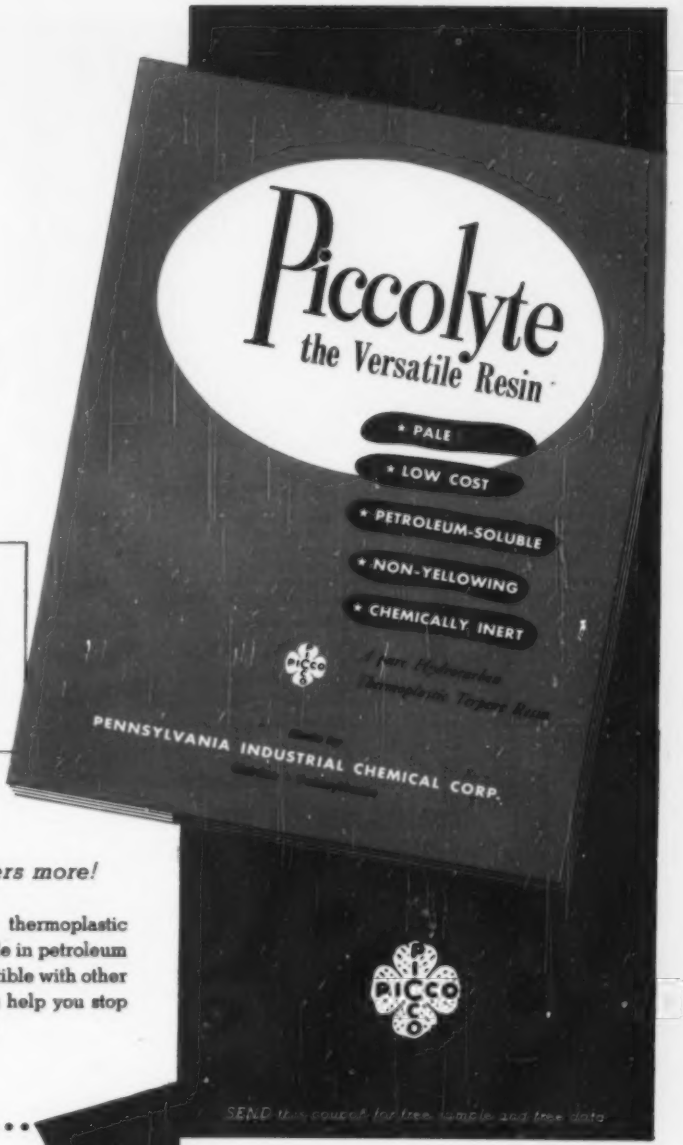
General features of the atomic energy industry are very similar to those of the chemical process industries. The raw material is uranium ore, and the basic process is the fission of the refined uranium by bombardment with neutrons in a nuclear reactor. The fission reaction releases heat and is accompanied by a chain reaction which,

put a **stop** to rising costs with

Piccolyte
The Versatile Resin

Costs less . . . offers more!

This pale color, non-yellowing thermoplastic terpene resin is low in cost, soluble in petroleum solvents, chemically inert, compatible with other ingredients. Its many economies help you stop rising costs. Get the facts today!



PENNSYLVANIA
INDUSTRIAL CHEMICAL
CORPORATION
Clairton, Pa.

Distributed by:
Falk Chemical Co., Pittsburgh, Pa., and Harwick Standard Chemical Co., Akron 8, Ohio

SEND this coupon for free sample and free data

Pennsylvania Industrial
Chemical Corporation
Clairton, Pennsylvania

Gentlemen:
Please send free sample of PICCOLYTE and your latest bulletin.

NAME..... TITLE.....
COMPANY.....
ADDRESS.....
CITY..... STATE.....

(ex)

DRYERS — DRYERS — DRYERS

STANDARD Rotary dryers are used throughout the world. STANDARD dryers are competently engineered and sturdily built in a wide variety of types and sizes for drying various products, such as fish meal, garbage, tankage, humus, fertilizer, sewage, sludge, agricultural products and countless chemicals. Stock designs available in sizes of 2 feet to 10 feet diameters. Let our engineers help you with your problems —regardless of your location.

We welcome your inquiries.

STANDARD STEEL CORPORATION

Engineers—Manufacturers

5001 Boyle Avenue Los Angeles, Cal.

PALMETTO Packings

PALMETTO® PACKINGS

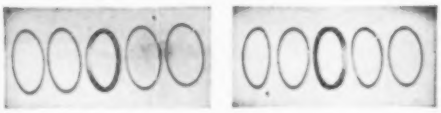
BASA® HAMMERS

FAVORITE® WRENCHES

EMPIRE MALLETS

Now! Extrusion damage eliminated!

AMAZING NEW G-T RING PACKING INTRODUCED AT POWER SHOW



PALMETTO G-T *Piston Assembly* PALMETTO G-T *Rod Assembly*

Extrusion of packing material into clearance between mating parts *absolutely eliminated* by new Greene, Tweed Palmetto G-T Ring Packing!

Designed for aircraft reciprocating and static hydraulic service to 10,000 psi . . . proven wherever a positive seal is required . . . temp 250 F to —70 F . . . fits all except rotary systems. Write for free descriptive bulletin TB-918.

• *Look to Greene, Tweed for better packings and special tools for all industry.*

GREENE, TWEED & CO.

NORTH WALES, PENNSYLVANIA

MORAN'S® COUPLINGS

"TUSKO" WALRUS POLISHING LEATHER

Contact your fully-stocked Palmetto distributor on all packing problems . . . ask him about our special tools.

under proper conditions, not only sustains the heat producing reaction, but also can breed a surplus of pure fissionable material. This surplus fissionable material can either be stockpiled for use in bombs, or it can be used as a fuel for the production of nuclear power.

Walter DeCew, Nucleonics, before American Society of Safety Engineers, Chicago, Oct. 19, 1948.

FUELS

Rail Fuel Efficiency

William T. Faricy

INSOFAR as their use in transportation is concerned, there is no form of inland transport which can move so many tons of freight so many miles with a given quantity of fuel as can the railroads. Railroads, on the average, move a ton one mile with two ounces of coal or with two tablespoons full of oil when burned in a steam locomotive, or with a teaspoonful of oil burned in a diesel engine.

To get some idea of what this sort of fuel efficiency means to the petroleum supplies of the nation, consider the fuel requirements involved in moving 100,000 tons of freight across the American continent by the various means of transportation.

To move this hypothetical freight by air across would require, in fuel, the contents of nearly 2,700 tank cars, each one containing 10,000 gal. of high-octane gasoline.

To do the same job by diesel truck would require the contents of 260 tank cars.

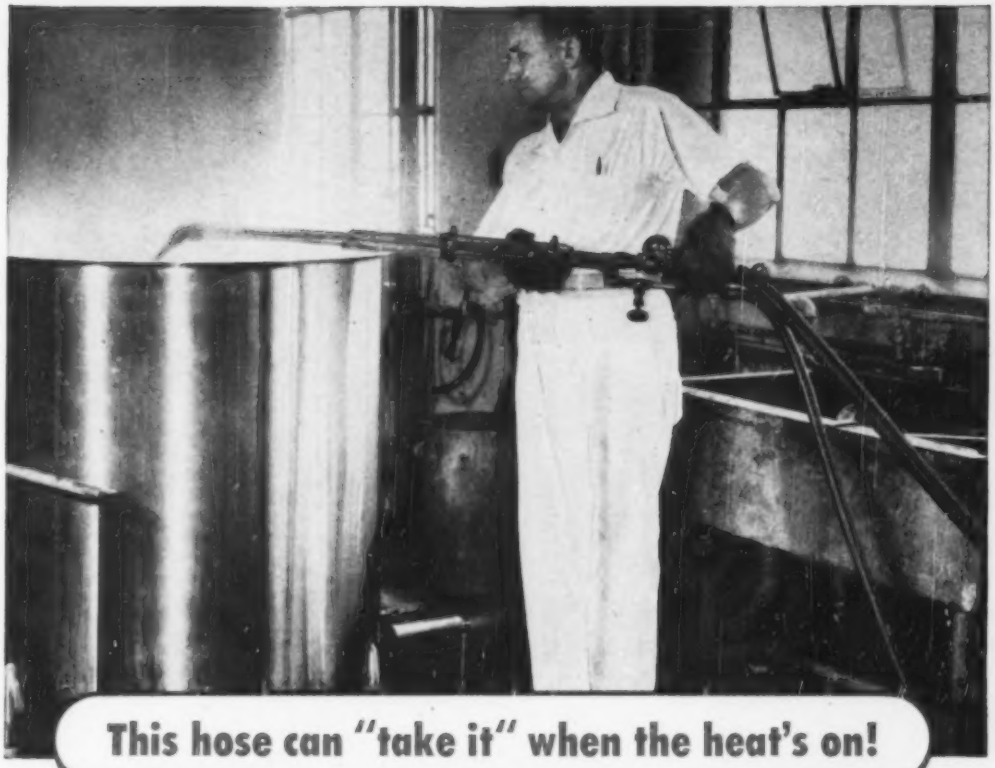
But to do the same job by railroad, using diesel locomotives, would require the contents of fewer than 90 such cars. From the standpoint of fuel efficiency, no other form of transportation serving the entire area of the American continent even approaches the railroad.

It is interesting to consider the contrast between doing this hypothetical transportation job by trains using diesel locomotives and doing the same job by trains powered with oil-burning steam locomotives.

As against less than 90 tank cars of diesel fuel which would be required, oil burning steam locomotives would use about 460 tank cars of heavy residual oils to do the same job.

The railroads' ultimate requirements will increase. But the fact is that increasing substitution of diesel locomotives for oil-burning steam locomotives is reducing the total railroad consumption of petroleum, rather than increasing it.

Despite the efficiency in the use of petroleum products which can be



This hose can "take it" when the heat's on!

Hewitt Fiberglas Steam Hose handles high pressures safely, too

If your job calls for handling compressed steam, your best insurance is Hewitt Monarch Fiberglas Steam Hose.

That's because this super-strength hose is designed to give you continuous safe delivery of saturated or superheated steam. It permits you to use steam up to 200 pounds pressure!

The secret of such performance lies in its construction. Hewitt-Robins engineers discovered an entirely new way to make glass fiber adhere to rubber. They utilized this method to give you a steam hose *reinforced with braided glass fiber cords.*

Remember, too, that another exclusive Hewitt development gives you an even greater safety margin. This is the hose's specially compounded heat-resisting rubber tube. It won't crack nor flake. And it retains its softness and flexibility even under continuous service.

Small wonder, then, that Hewitt Monarch Fiberglas Steam Hose stands up day in and day out under heavy pressure! Small wonder, too, that *it can "take it" when the heat's on!*

Find out today why this extra quality steam hose is your best bet for handling steam under extreme conditions. You can also get Hewitt Ajax Steam Hose for general service. See your distributor or write to the Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

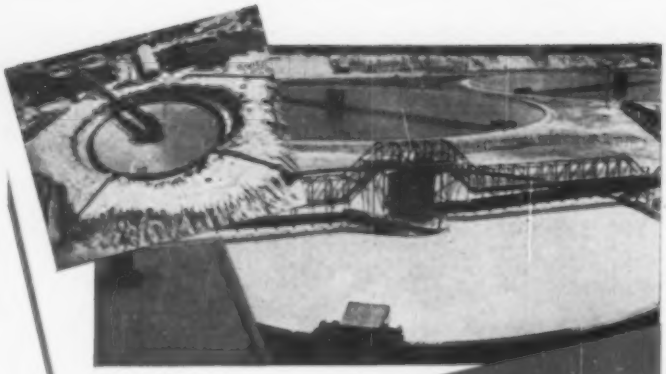
HEWITT
FIBERGLAS
STEAM HOSE

HEWITT RUBBER DIVISION
INDUSTRIAL HOSE • BELTING • PACKING

Hewitt also offers the chemical industry the following complete line of hose

Air Hose • Acid Hose
Acid Suction Hose
Agricultural Spray Hose
Chemical Engine Hose
Flexible Rubber Pipe Hose
Industrial Vacuum Hose
Rubber-Covered Fire Hose
Water Hose

HEWITT-ROBINS HR **INCORPORATED**



PUSH BUTTON CONTROL
OVER
OVERLOADS, SURGES or STALLS

GENERAL American Hydroseparators, whether 50′ or 383′ in diameter, contain the same fundamental design features.

Automatic or push button control of Hydraulic Rake Arm lifting and lowering mechanism, insuring optimum performance at all times and ability to absorb surges, stalls and overloads without attention by operators.

Ruggedness and power sufficient to produce underflows of maximum density and to handle large tonnages of coarse as well as fine solids.

OTHER GENERAL AMERICAN EQUIPMENT

CALCINERS
DRYERS
EVAPORATORS
THICKENERS
DEWATERERS
TOWERS
TANKS
BINS
TURBO-MIXERS
FILTERS
KILNS

GENERAL AMERICAN TRANSPORTATION CORPORATION
PROCESS EQUIPMENT DIVISION
SALES OFFICE: 10 East 49th St., Dept. 800 New York 17, N. Y.
WORKS: Sharon, Pa., East Chicago, Ind.
OFFICES: Chicago, Cleveland, Pittsburgh, Louisville
Orlando, St. Louis, Salt Lake City, Sharon, Washington, D. C.
TRADE MARK

achieved by railroads, the suggestion has been advanced in some quarters that railroads should be required, as a conservation measure, to confine their fuel uses to coal. Coal is, of course, the principal railroad fuel, with which approximately two-thirds of the load is moved. There has been great progress in recent years in the more efficient use of coal, and more progress is anticipated as a result of the several fundamental researches now under way. Nevertheless, railroads should not be restricted to the use of coal alone, or for that matter to any other one type of fuel.

The very essence of progress toward fuel efficiency, and true conservation of resources, is in the opportunity to use for each transportation task the particular type of fuel which has shown itself best adapted, all things considered, to the task at hand.

This may be coal in one situation, residual oils in another, distillate fuel in a third, gasoline in a fourth—but whatever the best fuel might be for any particular task, the railroads should have the same unlimited opportunity to make use of it that is accorded to other forms of transportation. Indeed, the interplay of competition among all these types of fuel tends toward true conservation by spurring progress in the most efficient use of each.

William T. Faricy, Association of American Railroads, before American Petroleum Institute, Chicago, Nov. 9, 1948.

AGRICULTURE

Differences in Activity of Plant Growth Substances

F. W. Went

THE GROWTH hormone of plants takes part in a far greater number of reactions and processes than was originally expected. It causes cell elongation, root formation, lateral bud inhibition, parthenocarpic development of fruits, prevents abscission of leaves and fruits, etc. A number of substances all possessing the same basic molecular configuration are active in these processes. Structurally closely related substances like 2,4-D are used on a large scale as weed killers. To explain this multiplicity of responses, and to understand the differences in quantitative response between plants, it becomes necessary to differentiate between physical and chemical properties of these substances. It has been shown that the difference in the rate of translocation through tissues or the permeability of a substance into cells of different plants may explain apparent differences in activity.

Both indoleacetic acid and 2,4-D

elicit the same basic response in the pea test. In higher concentrations they exert a purely additive effect when mixed. However, when they are mixed in such low concentrations that neither is very effective, the resultant response is more than twice that which could be expected from a purely additive effect. This can be explained on the basis that at these low concentrations indoleacetic acid and 2,4-D actually participate in two different reactions which supplement each other. At higher concentrations either of these two substances can provoke both reactions. Further evidence of the correctness of this interpretation can be given by the use of hemi-auxins, which at any concentration can provoke only one of these two reactions.

F. W. Went, California Institute of Technology, before National Academy of Sciences, Berkeley, Calif., Nov. 16, 1948.

CHEMICALS

Fluophosphate Chemicals

Wayne E. White

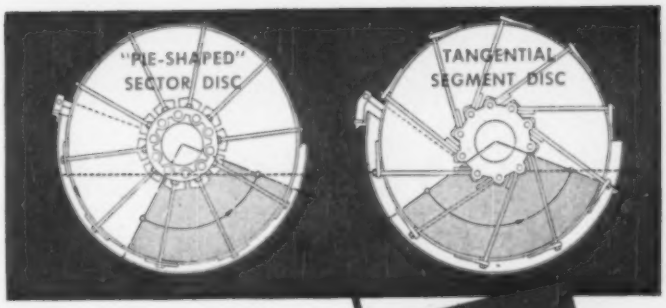
Discovery by German chemists of a series of synthetic compounds containing phosphorus and fluorine received little attention elsewhere until the beginning of World War II, when British researchers re-examined the scientific literature and found reports on marked toxicity shown by certain of these chemicals known as esters of monofluophosphoric acids. These compounds have since been identified as the German "nerve war gases and gases that drive men mad."

The esters, however, do have their good side also. Di-isopropyl fluophosphate, commonly called DFP, has come into medical use in the treatment of glaucoma, an eye condition characterized by an increased pressure of the fluid within the eyeball. DFP may be of unique value also in treating paralytic ileus, a nerve-muscular disorder of the intestine, and myasthenia gravis, an extreme muscular weakness.

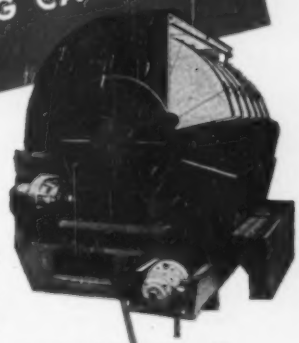
The pronounced effect of the esters on the nervous systems of animals and man results from their ability to inhibit the action of cholinesterase in the nerves. Cholinesterase is a body chemical which acts as a brake, permitting a muscle to relax after it has been contracted by a nerve impulse. Without sufficient cholinesterase activity, the animal builds up to a state of extreme excitement, which may increase to the point of madness.

The laboratory methods of Dr. Langer, father of the new compounds, have been modified so that chemicals containing fluorine and phosphate can be produced on a larger scale.

Research is now directed at uncov-



CHANGED DISC DESIGN GIVES A 23% INCREASE IN DEWATERING CAPACITY



CONKEY Rotary Disc Vacuum Filters with the improved Conkey tangential segment disc in place of the conventional "pie-shaped" design, provide greater dewatering capacity in proportion to floor space occupied than any other type of continuous filter.

They are lower in first cost for dewatering operations within the particle size range of correct filter applications.

Write for bulletin #102 for a description of their design, construction and application.

GENERAL AMERICAN TRANSPORTATION CORPORATION

PROCESS EQUIPMENT DIVISION

SALES OFFICE: 10 East 49th St., Dept. 888 New York 17, N. Y.

WORKS: Sharon, Pa., East Chicago, Ind.

OFFICES: Chicago, Cleveland, Pittsburgh, Louisville Orlando, St. Louis, Salt Lake City, Sharon, Washington, D. C.

TRADE MARK

68% moisture in the filter cake was too high—

So a FEinc String Filter Got it Down to 59%

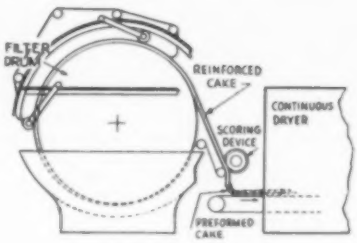
An ordinary rotary vacuum filter on an iron pigment couldn't go lower than 68% cake moisture—too "sloppy" to be dried in a continuous dryer—so a FEinc String Filter with FEinc Compression dewatering was tried. Now containing not more than 59% moisture, the cake is firm, easily handled by the dryer. Here's how the FEinc filter did it:

1 FEinc STRING DISCHARGE LIFTS THE CAKE. The cake is built up over endless strings which pick the cake off the cloth in one continuous sheet.

2 FEinc STRING DISCHARGE ELIMINATES BLOW-BACK. In the previous scraper type filter, the cake was loosened by compressed air which couldn't help blowing some of the filtrate back into the cake from the drain lines.

3 FEinc GETS CAKES DRYER BY COMPRESSION. Exclusive compression mechanism squeezes the cake, closes up cracks, prevents "short circuiting" of vacuum. Saves 5 to 25 hp. on vacuum requirements.

4 FILTER CLOTH LASTS LONGER, TOO. There's no scraping wear, no "blinding." And because there's no wire winding, you save hours in changing time.



Adaptable to Continuous Dryer

Any combination of FEinc features can be built to make your tough filtering, washing, drying, and cake handling seem easy. More details in free Bulletin 101—have you your own copy?

Send for Bulletin 101 Today

FILTRATION ENGINEERS INC.

155 ORATON STREET · NEWARK 4, N.J.

16

ering new and unusual properties of the fluophosphate chemicals, some of which promise to be valuable in medicine, dentistry, welding, and the etching of glassware.

Wayne E. White, Ozark-Mahoning Co., before American Chemical Society, Tulsa, Oct. 30, 1948.

Rubber

Power Problems in Rubber Processing

A. H. Nellen

THE POWER needed to process rubber has been increased in recent years by the use of the newer synthetic rubbers and carbon blacks. Severe, repeated overloads have been imposed on blending machines by certain types of rubber mixtures for tire treads, and factory equipment, in general, is being operated today at or above its rated capacity.

By careful arrangement of the order in which the various ingredients are added during the mixing operation and by properly timing their addition, these high power demands can be substantially reduced.

Synthetic rubbers require more power than natural, and the new low-temperature synthetic materials, being tougher than the standard GR-S, is the worst offender.

Each of the many types of carbon black also has its own characteristic effect on power requirements, and this effect varies with the carbon black-rubber combination. A combination of one type of black with crude rubber might require relatively low power, but when the same black is added to low-temperature polymers the power requirement is extremely high.

The blending of various types of carbon black and also the blending of various polymers is another effective way of reducing power consumption. There are also indications that the ratio of carbon black to plasticizer, or softening agent, is important, and that certain types of plasticizers exert characteristic effects on power requirements.

A. H. Nellen, W. B. Dunlap, Jr., and C. J. Glaser, Jr., Lee Tire & Rubber Co., before Rubber Division, American Chemical Society, Detroit, Nov. 8, 1948.

Rubber

Reclaim Improves Rubber

J. M. Ball & R. L. Randall

LIFE of many rubber products has been extended through the use of reclaimed synthetic rubber. Before the war reclaim was derived almost exclu-

Check

this list of WIGGINS GASHOLDER engineering and operating advantages when you think of storing chemical process gases, such as

CO_2, CO, H_2, N, CH_4

✓ Takes advantage of the strong, flexible, impervious qualities developed in synthetic rubber fabrics by the chemical and process industries.

✓ Has an absolutely dry frictionless seal.

✓ Is unaffected by heat, cold, ice, snow, wind or rain—even earthquakes.

✓ Delivers gas exactly as received, dry, pure, undiluted.

✓ Has less than ½ of 1% dead space for quick purging.

✓ Will give years of continuous performance without mechanical servicing.

These all add up to the fact that only with a Wiggins Gasholder can you store chemical process gases with

NO OPERATING COST
PRACTICALLY NO MAINTENANCE

A General American engineer will be glad to give you further details.

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 SOUTH LA SALLE STREET, CHICAGO 90, ILLINOIS

BRANCH OFFICES: New York • Washington, D. C. • Cleveland
Buffalo • Pittsburgh • New Orleans • Tulsa • Dallas
Houston • Seattle • Los Angeles • St. Louis • San Francisco

TRADE MARK

If your problem is to pump any of these or similar liquids, look to Viking for your answer. Capacities ½ to 1650 gpm—pressures to 200 psi,—500 psi on hydraulic oils.

Send for free bulletin 475C today.

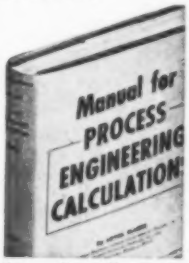
See Our Catalog in SWEETS

Viking PUMP COMPANY
Cedar Falls, Iowa

Speed up and simplify calculations in designing chemical processes

This wealth of design data includes over 300 tables, charts, diagrams and equations

This indispensable manual supplies engineers and chemists with a vast supply of concise, practical data to aid in engineering the development of chemical processes—from the research report stage to the final design stage. The material covers conversion factors, physical and mechanical processes, equipment performance factors, and briefs of the theory involved in unit operations common to many processes.



Manual for

Process Engineering Calculations

By Loyal Clarke, *Chemical Engineer, Celanese Corporation of America; Formerly with Petroleum Chemicals, Inc., and the United States Bureau of Mines*

EMPHASIS is placed in this invaluable process engineering manual on condensed methods of presentation. Working relations are highlighted throughout. The aim has been to supply the process engineer with just the information he needs, and to enable him to get at it as quickly and easily as possible.

Featured are hundreds of tables, charts and equations which are of the most aid in process engineering. Each is self-explanatory, and includes a complete listing of symbols, their significance, and units.

438 pages, 6 x 9, 145 figures 160 tables, $6.00

See It 10 Days FREE • Mail Coupon

Read over the chapter headings:

A. Perspective
B. Numerical and Mathematical Data
C. Conversion Tables
D. Physical and Mechanical Properties
E. Thermodynamic Data
F. Piping, Hydraulics, and Flow Measurements
G. Heat Transfer
H. Combustion
I. Power
J. Pumps
K. Fans, Blowers, and Compressors
L. Absorption, Stripping, Distillation
M. Water

McGraw-Hill Book Co., 330 W. 42 St., NYC 18
Send me Clark's Manual for Process Engineering Calculations for 10 days' examination on approval. In 10 days I will send $6.00, plus few cents postage, or return book postpaid.

Name .....
Address .....
City and State .....
Company .....
Position CE-1-49

sively from natural scrap rubber, but today synthetic GR-S is so largely used in tires that reclaim has become rich in man-made material.

This change in the composition of reclaim has been largely beneficial to the properties thereof. Modern reclaims tend to be particularly resistant to the gradual inroads of oxygen, which causes rubber to lose its elasticity and strength. A high proportion of GR-S in the reclaim enhances this resistance. Best results are achieved by mixing reclaimed rubber with either the natural or the synthetic material.

Rubber reclaiming is a big business, as shown by the fact that 300,000 tons of the salvaged material are consumed in the United States each year. This amount is about 30 percent of the total new rubber, both natural and GR-S.

Aging is a consideration of prime importance in the rubber industry. Various industrial rubber products such as hose, packing, and tubing are bought on specifications written by important agencies like the Board of Fire Underwriters, the municipality of New York, the Navy, and departments of our federal government. These specifications naturally contain provisions for insuring long life of the articles by requiring what are known as accelerated aging tests to be made in a hot air oven and in an oxygen bomb under pressure. These are standard tests widely used throughout the rubber industry.

J. M. Ball and R. L. Randall, Midwest Rubber Reclaiming Co., before Rubber Division, American Chemical Society, Detroit, Nov. 9, 1948.

SYNTHETIC RUBBER

Prognostication

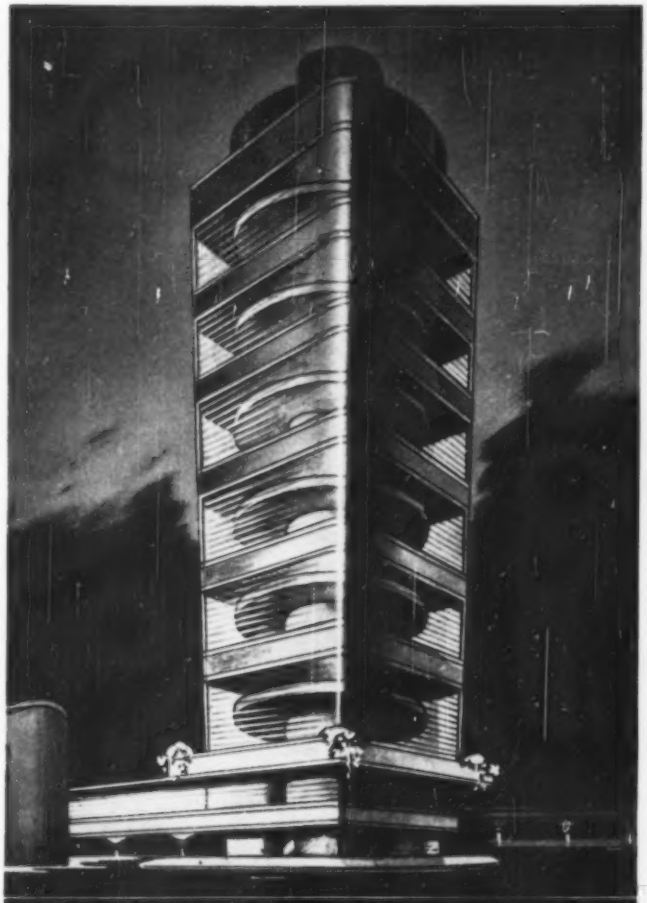
W. F. Tuley

SYNTHETIC rubber, greatly improved since the war, will from now on be preferred over natural rubber for many large volume uses, even if the price of the tree-grown material should drop somewhat.

The latest improvement in synthetic rubber, the new cold type made at freezing temperatures, will find its way into treads of premium quality tires as rapidly as production of the superior material can be stepped up. Reconstruction Finance Corporation recently authorized conversion of about one-half of the country's synthetic manufacturing facilities to production of cold rubber.

Tire tests have shown that the latest improvements in synthetic rubber have provided a material that wears 30 percent longer than natural rubber and resists cracking and cutting as well. Widespread use of the superior rubber

Modine Coils will Heat and Cool Revolutionary Research Tower



WAX RESEARCH TOWER DESIGNED BY FRANK LLOYD WRIGHT

Johnson's new Wax Research Tower will be a compact, tall stack, 40 feet square and 156 feet high. It will be supported by a circular masonry stem to which each of the 15 floors are connected. Curtain walls are of tubular glass. Alternating with the main floors are circular floors 38 feet in diameter.

New S. C. Johnson & Son, Inc. Addition to Use Modine Coils In Air Conditioning System

•

RACINE, WISCONSIN—Under construction by S. C. Johnson & Son, Inc., is a 15-story Wax Research Tower — principal feature of a new laboratory designed for Johnson by the world-famous architect, Frank Lloyd Wright.

•

Wright's advanced design calls for all heating and air conditioning to be supplied from a central shaft extending through the center of the tubular glass tower. Playing an important role in this unique heating and air-conditioning system designed by Samuel R. Lewis, Associates, Chicago Consulting Engineers, *are more than 70 Modine Heating and Cooling Coils.*

•

Like Johnson and many other well-known firms in industry—you can rely on Modine to give you the right answer to your heating and cooling coil problems. With 8 types and more than 3600 models and sizes to choose from, it's easy to select the right Modine Coil to fit your specific air-conditioning or processing requirements. Get complete facts. Write for literature, or call the Modine Representative listed in the "Where-to-Buy-it" section of your phone book. Modine Manufacturing Company, 1525 Dekoven Avenue, Racine, Wisconsin.

GET COMPLETE MODINE HEATING AND COOLING COIL CATALOGS TODAY!

Memo to Equipment Manufacturers:

If you build equipment using heating or cooling coils, Modine engineers will be happy to work with you in developing coils which exactly meet your specific requirements. Write today!

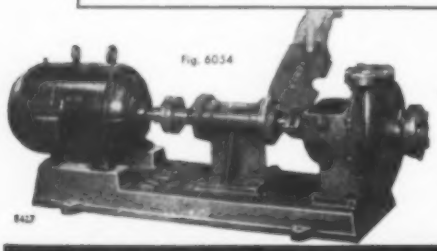
Modine COILS • FOR HEATING OR COOLING

NO AIR LEAKAGE THRU STUFFING BOX INTO VACUUM

Taber Single Suction Centrifugal Pumps are as adaptable as they are efficient.

For handling chemical solutions, they are equipped with a drip chamber and cover. When in vacuum service on evaporators, the water-filled drip chamber prevents air from entering thru the packing. This water-sealing of the stuffing box is absolutely dependable.

FOR COMPLETE INFORMATION, PLEASE WRITE ON YOUR LETTERHEAD FOR TABER
SPECIAL BULLETIN CL-339



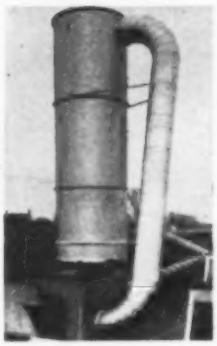
TABER PUMP COMPANY
ESTABLISHED 1859
294 ELM STREET
BUFFALO 3, N. Y.

TABER PUMPS for Higher Practical Performance

REMOVE and RECLAIM
Valuable by-products
THE
MULTI-WASH WAY

Where the by-product has a salvage value, a Schneible Multi-Wash will quickly return its cost in direct savings . . . and has been a profitable investment for a great many chemical manufacturers. Hundreds of successful applications are in use today.

Schneible Engineers are available for suggestions on special designs and arrangements to cope with unusual conditions . . . such as the Multi-Wash Collector furnished a large Eastern chemical manufacturer which uses *24 impingement stages!* Your inquiry is invited.



Chemical plant installation of 12,000 c.f.m. capacity special Multi-Wash Collector. Four different washing liquids are used in this tower to absorb and salvage valuable process by-products.

LIQUID VAPOR INTIMATE CONTACT EQUIPMENT FOR DUST COLLECTION — ABSORPTION — CONDENSATION AND TEMPERATURE REDUCTION

Claude B. Schneible Co., 2827 Twenty-Fifth St., Detroit 16, Mich.

SCHNEIBLE

is also seen in rubber footwear, wire insulation, mechanical goods and other products. Makers of rubber products other than tires already are using 25 to 30 percent of all GR-S synthetic consumed on a voluntary basis (not required by law).

Demand for the superior synthetic will probably exceed supply for the next 12 to 18 months and may not be adequate until nearly 100 percent of GR-S synthetic rubber produced is of the cold type.

W. F. Tuley, United States Rubber Co., before New York Rubber Group, New York, Oct. 15, 1948.

PLASTICS

$-(CF_2-CFCl)_n$

Louis C. Rubin

Production of a material of high enough molecular weight to have useful physical properties as a plastic is obviously by polymerization of a low molecular weight olefin. The existence of fluorocarbon-type plastics is dependent upon the significant fact that while fully chlorinated olefins such as tetrachloroethylene and hexachlorobutadiene tend to be unreactive, highly fluorinated olefins are reactive and most usefully will undergo polymerization reactions. For example, tetrafluoroethylene and trifluorochloroethylene have been shown to yield high polymers. In the case of the latter compound, useful low polymers in the oil and wax range of molecular weight have also been produced.

Kel-F is a high polymer of trifluorochloroethylene. It may be produced by dechlorination (Zn + alcohol) of trichlorotrifluoroethane:

$$CFCl_2CF_2Cl \longrightarrow CF_2 = CFCl$$

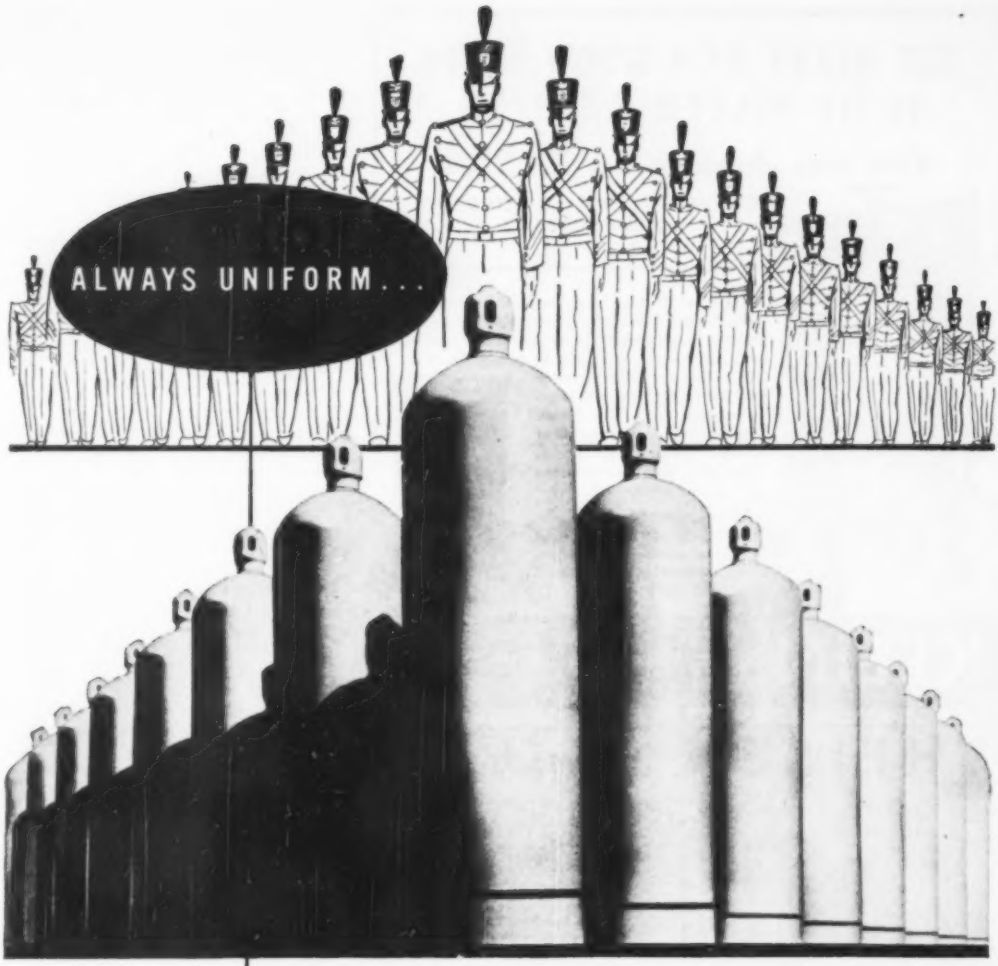
The large difference in boiling points (48 deg. C and −26 deg. C.) of the saturated and unsaturated permits the continuous separation of the olefin and facilitates the production of a pure monomer which is very essential to the production of any high molecular weight polymer.

The purified trifluorochloroethylene is polymerized with oxygen or peroxide promoters conventional to this type of polymerization:

$$nCF_2 = CFCl \longrightarrow -(CF_2CFCl)_n$$

It is significant that the resulting polymer is a saturated compound free of hydrogen.

As currently produced, the polymer is a high temperature, chemically inert thermoplastic that can be readily molded by established techniques. When produced in relatively thin sections, it can have good transparency. It is extremely inert chemically. No effect has been observed after prolonged exposure to concentrated sul-



TO PROTECT YOUR PROFITS

Every Hackney Seamless Cylinder is uniform in thickness and strength . . . a uniformity made possible by the Hackney Cold Drawing Process. Each cylinder is comparatively light in weight . . . yet rugged in construction. However, uniformity in Hackney Cylinders is not confined to physical characteristics alone. Look to performance records as well. There, you will see how Hackney Cylinders are alike in the utmost protection they provide your product . . . in their ability to deliver low transportation costs . . . in the long life each one provides. *For full details write us.*

Hackney
MILWAUKEE

PRESSED STEEL TANK COMPANY

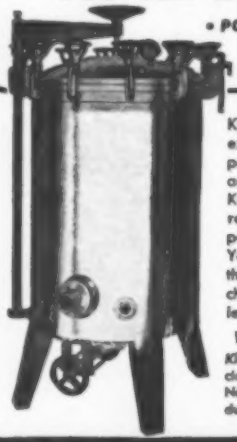
Manufacturers of Hackney Products

1447 South 66th Street, Milwaukee 14, Wis.

1325 Vanderbilt Concourse Bldg., New York 17
208 South La Salle Street, Room 2070, Chicago 4
203 Hanna Building, Cleveland 15
553 Roosevelt Bldg., Los Angeles 14

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

THE HEART OF A GOOD FILTER
IS ITS FILTER LEAVES
You can depend on KLEIN
• POSITIVE FILTRATION • NO CLOGGING
• FULL DRAINAGE



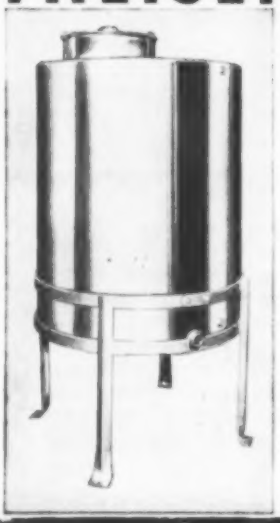
Klein Ideal Diatomaceous Earth Filters and the exclusive Klein Filter Leaves, in combination, assure positive filtration at all times. Operation, cleaning and maintenance costs are at a minimum with Klein Filters. In addition, many radical innovations are incorporated in Klein Ideal Filters. You'll want to know about all of these if you have an industrial, chemical or food filtration problem in your plant.

Write for latest Klein Bulletin

Klein Filter Leaf—If damaged, metal cloth easily replaced. No rivets. Note horizontal headers—central duct—Klein Cleanout Cap.

KLEIN ESTABLISHED 1909
FILTER & MANUFACTURING COMPANY
1223-29 School Street • Chicago 13, Illinois

THEISEN *Stainless Steel*
STORAGE TANKS
10 TO 1,000 GALLONS



ALSO IN
ALUMINUM
MONEL • COPPER
RUBBER LINED AND
LEAD LINED STEEL

Process Equipment made to your specifications or Origineered by us

MANUFACTURED BY
METAL PRODUCTS CORPORATION
50 W. 19th ST. *Est. 1923* WEEHAWKEN, N.J.

phuric, hydrofluoric, and hydrochloric acids, to strong caustic, to fuming nitric acid, aqua regia and other vigorous oxidizing materials.

It can be molded by conventional compression, injection, transfer and extrusion procedures. The essential difference in molding this and most other thermoplastic materials is that with it molding temperatures are appreciably higher being in the range of 550 deg. to 600 deg. F., depending on the particular operation. In general, electrical heating is required.

Physical properties can be varied in a manner similar to plasticizing by variations in heat treatment. A rapid quenched piece gives a transparent, flexible section of moderate surface hardness, more or less typical of a plasticized material. If this same section is slow cooled from the molding temperature it becomes translucent, much less flexible and appreciably harder. Intermediate properties result if the molded item is held just below the transition temperature (ca. 400 deg. F.) for a time.

Mechanical properties are outstanding. It has a tensile strength of about 9,000 psi. at room temperature. It can be made flexible or hard as discussed above and at the same time is very tough over a temperature range from that of liquid nitrogen to about 400 deg. F. It is a resilient material and does not show cold flow when used as a gasket material. When loaded sufficiently to deform, recovery is substantially complete upon removal of the load.

The light transmission indicates possible uses as "unbreakable" corrosion resistant window material in various fields. For such applications the polymer may serve as its own gasket.

Louis C. Rubin, M. W. Kellogg Co., before the Society of the Plastics Industry, Manchester, Vt., Oct. 14, 1948.

EUROPE

Consultants Abroad

Robert S. Aries

Despite the tremendous possibilities which exist in Western Europe for consulting chemists and chemical engineers, a number of factors within and beyond their control have heretofore reduced these opportunities to only some haphazard and sporadic assignments on the part of only a few of them.

In fact, an anomalous and almost absurd condition exists with respect to the demand and supply for consultants in Western Europe. They are desperately needed and wanted, yet they cannot perform services with any degree of ease. It is hoped that the

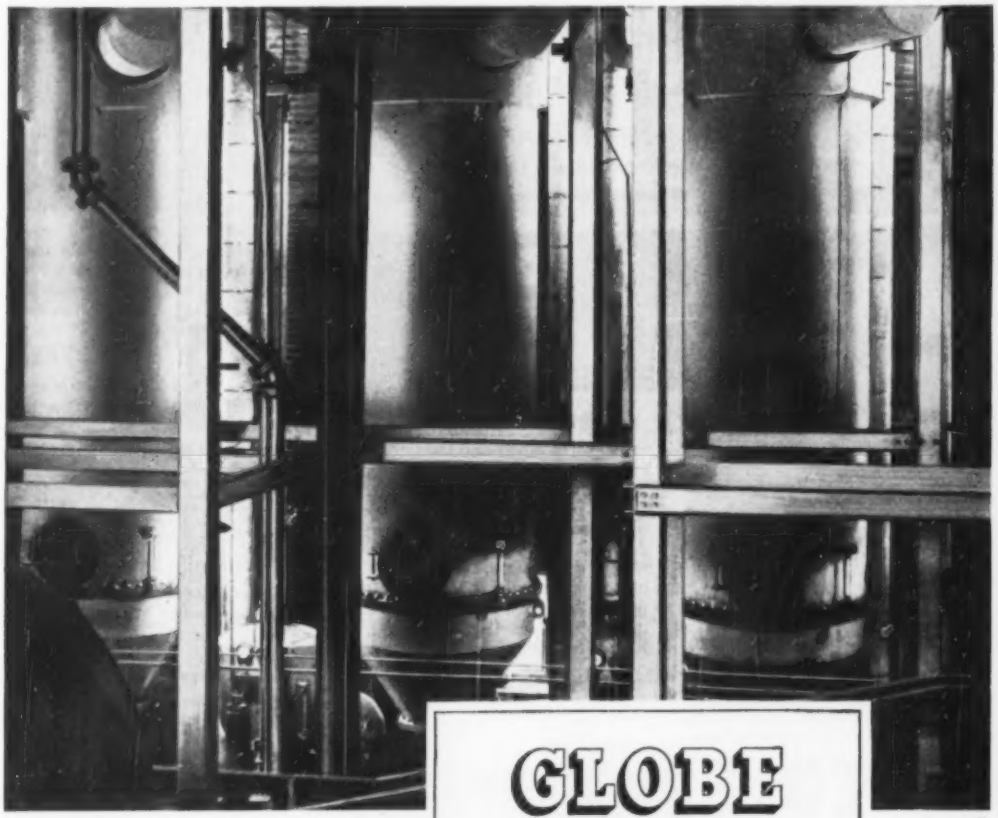
Right way to carry strong liquor

A plant making Kraft board and Kraft paper was faced with a "liquor problem". In this case it was black liquor — a highly corrosive alkaline sulphide solution used in the sulphate process of paper making.

The problem — what tubes to use in vertical multiple effect evaporators?

Globe engineers were called in. After careful study they recommended Gloweld (electric-welded) Stainless Steel Tubing-Type 304. Result — another customer found a highly efficient, low-cost means to solve his problem.

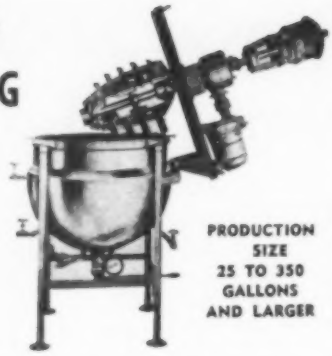
If you have problems in carrying high pressures, corrosive gases or liquids—in product contamination or structural fabrication—why not consult Globe Steel Tubes Co.? A million-dollar technical laboratory plus a large staff of scientists and engineers is at your service. Write Globe Steel Tubes Co., Milwaukee 4, Wis.



Globe Seamless Stainless Steel Tubes — Gloweld Welded Stainless Steel Tubes — Globe Mechanical Tubes — Globe-iron Seamless High Purity Ingot Iron Tubes—Globe Aircraft Tubes — Pressure Tubes — Carbon and Alloy Steel Tubes — Globe Welding Fittings.

GLOBE
Stainless
STEEL TUBES

A NEW TOOL
FOR
BETTER MIXING
THE
AGI
MIXER
TWO MIXERS
IN ONE



PRODUCTION
SIZE
25 TO 350
GALLONS
AND LARGER

Combines Paddle Mixer and Homogenizer

The new AGI-MIXER (incorporating our HOMO-MIXER) gives a FINER mix than any other apparatus, frequently in 1/10th the time. Material is agitated slowly by the paddles of AGI-MIXER, being worked downward to the HOMO-MIXER, which mixes and shears at high speed and pressure. This produces particles of extremely fine size, which are rejected upward again to the AGitator paddles. Thick heavy viscous mixtures can be mixed and homogenized at the same time. We furnish complete outfit, including motors and kettle. Sizes from laboratory to production plant.

WRITE FOR COMPLETE DATA TODAY

EPPENBACH, *Incorporated*

45-10 VERNON BLVD. LONG ISLAND CITY 1, N. Y.

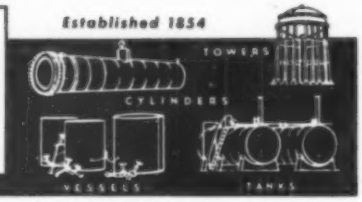
TOPS
IN
TANKS

• Scores of cities and industries rely on Cole elevated tanks for dependable water service and constant pressure. Available in capacities of 5,000 to 2,000,000 gallons and in a wide range of designs. Our skilled engineers stand ready to fill your requirements. Write for quotations, giving capacity, height to bottom, and location.

Write for latest Cole catalog — "TANK TALK"

R.D. COLE
MANUFACTURING CO.
NEWNAN, GA.

Established 1854



Marshall Plan will change this difficult situation and establish a *modus operandi* without undue red tape.

The factors in favor of the American chemical and chemical engineering consultant in Western Europe are:

1. The shortage of chemists and virtual absence of chemical engineers in the modern sense of the word.
2. The tremendous advances in the American chemical process industries during the last decade, as contrasted with a relative standstill in most of the European industries.
3. The absence of intense competition, due to the decreased activities of German technologists.
4. The high respect and spirit of friendliness which Europeans have toward American know-how and American engineers.

In contrast with the above, there are a number of factors which hinder the work of the consultant. Among these are:

1. The lack of dollar exchange, which is most often complicating the demands of the consultant.
2. Lack of appreciation of the role of a consultant. Since they are virtually non-existent in Europe, companies should actually be advised before any services can be rendered.
3. The pride of some firms or public officials — sometimes justified — that their nationals can "do it just as well."
4. The decrease in U. S. investments abroad, which were the easiest means of approach to foreign work.
5. The increase in government projects in Western Europe, involving more red tape and generally steering away from the consultant, especially the small ones.
6. The lack of appreciation of research development and "bug" removal and the desire to purchase complete know-how which will function well from the first day.

Robert S. Aries, R. S. Aries & Associates, before Association of Consulting Chemists and Chemical Engineers, New York, Oct. 26, 1948.

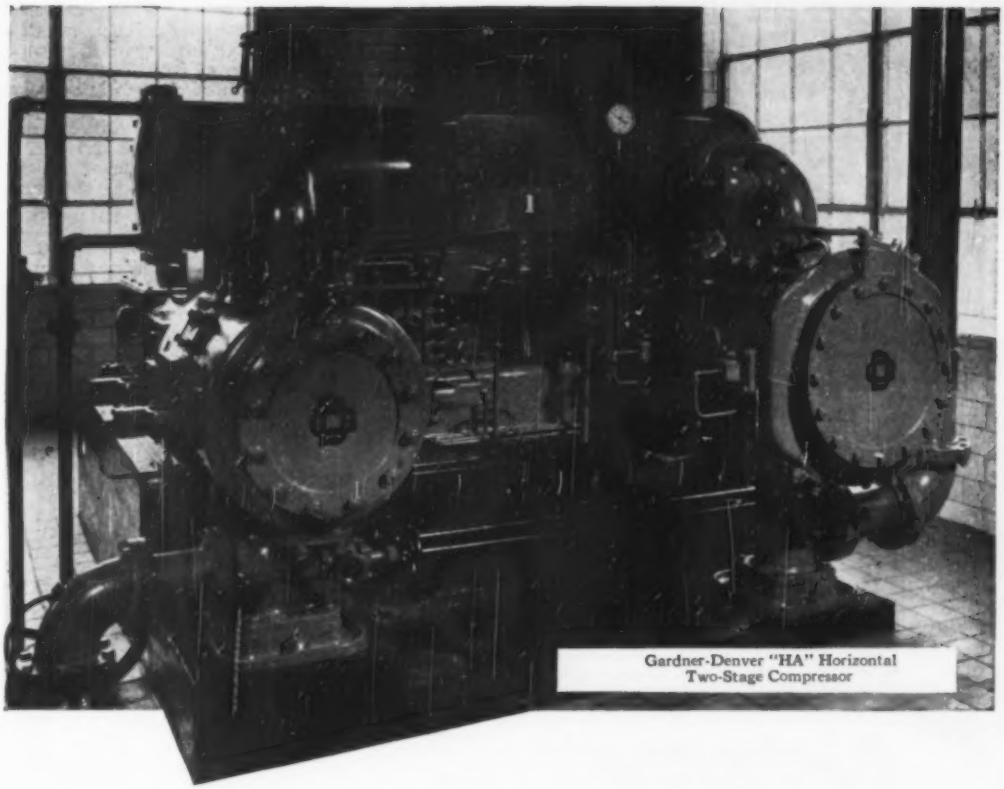
DISTILLATION

Column Efficiency

Lloyd Bery & D. O. Popovac

TEST results indicate that column efficiency is independent of pressure and that it may be possible to base vapor-liquid equilibrium data determined at the same pressure as that at which the column is to operate since the HETP of a given packing remains constant.

A test rectification column measured 1 in. in diameter by 2 ft. long over-all and was filled with ¼ in. stainless steel Fenske helices. The test



Gardner-Denver "HA" Horizontal
Two-Stage Compressor

For MORE Years of Service

Why do Gardner-Denver "HA" Horizontal Compressors continue to give you full-load, heavy-duty service year after year? Why do volumetric efficiencies remain high, horsepower requirements stay low? One reason is that their cylinders are *correctly* designed. Valve and port areas are large and unrestricted—resulting in low velocities and minimum friction losses. Highly effective water jacketing further reduces heat of compression . . . insures thorough lubrication with less oil . . . increases compression efficiency. Here are other "HA" features you will like:

* *Air Cylinders oiled by force-feed lubricator with separate and adjustable feed to each cylinder.*

* *Heavy-duty side crank type main frame of massive design—heavily ribbed and reinforced to give maximum strength and rigidity.*

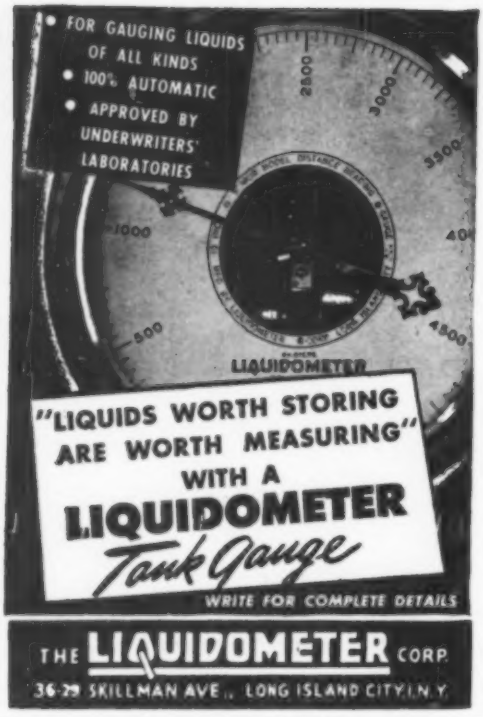
* *Alloy cast steel box type crossheads with removable high-lead-bronze shoes.*

* *Duo-Plate cushioned valves for high delivery capacity, high compression efficiency and lowest power consumption.*

* *Timken Roller Main Bearings eliminate shaft friction and wear—provide permanent rigidity with freedom from bearing vibration, pounding and side thrust.*

For complete information, write Gardner-Denver Company
Quincy, Illinois

GARDNER-DENVER
SINCE 1859


• FOR GAUGING LIQUIDS OF ALL KINDS
• 100% AUTOMATIC
• APPROVED BY UNDERWRITERS' LABORATORIES
LIQUIDOMETER
"LIQUIDS WORTH STORING ARE WORTH MEASURING" WITH A
LIQUIDOMETER
Tank Gauge
WRITE FOR COMPLETE DETAILS
THE LIQUIDOMETER CORP.
36-29 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

The BIG BOY for BIG JOBS
1¼-1½-2
Pipe Sizes
TYPE E-41
Pressure Reducing Valve
Large buildings in high water pressure areas need reducing valves to bring the pressures under control.
The ALL-BRONZE CASH-ACME Type E-41 Pressure Reducing and Regulating Valve was designed to do this job. Its large passageways and yoke type construction give ample capacity for apartment buildings and large homes. The E-41's SCREWED-IN CHROME SEAT makes maintenance easy while its Nycar seal and Neoprene diaphragm will reduce maintenance to a minimum. Deliveries are prompt.
Write for your free copy of our new 1948 Catalog for complete details on CASH-ACME Products.
Sold ONLY through plumbing and heating wholesalers. See them . . . ask for—
CASH ACME Automatic Valves
A.W.CASH VALVE MANUFACTURING CORPORATION
(1962 EAST WABASH AVENUE
DECATUR, ILLINOIS, U. S. A.

mixture consisted of n-octane-toluene and vapor-liquid equilibrium data were determined for this system at pressures between 20 and 760 mm. Hg abs. Operation of the column was just below the flooding point. Testing of the unit was done at total reflux and reflux ratios of 30:1 and 20:1.

In all cases it was found that the theoretical plates in the column as determined by corresponding vapor-liquid McCabe-Thiele equilibrium diagrams numbered between 11 and 14. The same column calibrated 14 plates at 760 mm. Hg abs. with a standard test mixture of n-heptane-toluene.

Lloyd Berg and D. O. Popovac, Montana State College, before American Institute of Chemical Engineers, New York, Nov. 10, 1948.

EUROPE

French Industry Is Recovering

R. S. Aries

INDUSTRY is encircled by governmental regulations in France. Out of 80 employees in one Paris office of a firm, 20 are working solely on government reports. The raw material situation seems somewhat like our own under the former WPB, only worse. Bread, sugar and meat are rationed, but the black markets flourish to the extent that the visitor is only slightly affected by the restrictions. Milk—not a typical French beverage—is scarce, but the restaurants offer a variety of good food only surpassed by prewar Paris. Service is still excellent, as compared to England and even to our own country.

Lack of confidence in the franc naturally leads to investment in plants and machinery. It is difficult to gage the situation, but the demand for goods is readily noticeable and is an encouraging factor.

In contrast to the British, French business men are generally optimistic. British industrialists see little possibility for improvement under the "status quo" which prevents a company from acquiring new customers, or selling new products to old customers. The British Government is bulk-purchasing imports, under extremely broad specifications, with only a slight regard for quality, which makes efforts to produce high-quality goods extremely difficult.

In spite of the better feeling among business men in France, the problems clamoring for solution are almost endless.

In the last year, substantial progress has been made in France's economic condition, and the outlook for the coming year seems encouraging, and confidence among business leaders is

Try an Amsco solvent for that *"impossible"* job

In many a plant today an Amsco solvent is being used to solve problems, that, at first, seemed almost impossible.

One reason for this is that our petroleum-base solvents are so extremely flexible and versatile. Add to this flexibility Amsco's quarter century of seasoned experience, and you can see why we welcome the chance to tackle knotty problems.

Amsco solvents are dependable . . . efficient . . . economical. They cost no more than less time-tested materials and you get:

- *Choice of volatility*
- *Choice of solvency*
- *Any desired boiling range*
- *High degree of purity with good odor*
- *Amsco's "Service that goes beyond the sale"*

Amsco offers the most complete line of petroleum-base solvents available. And deliveries can be made promptly *anywhere* in the U.S.A.

Why not find out what these versatile solvents can do for your business. For full details . . . and with no obligation whatever . . . mail the coupon today!

SERVICE IN 48 STATES

AMERICAN MINERAL SPIRITS COMPANY

CHICAGO, LOS ANGELES, NEW YORK

ATLANTA • BOSTON • BUFFALO • CARTARET, N. J. • CINCINNATI • CLEVELAND
CORPUS CHRISTI • DETROIT • FORT WAYNE • GRAND RAPIDS • HOUSTON
INDIANAPOLIS • KEARNY, N. J. • MILWAUKEE • NEW ORLEANS • PHILADELPHIA
PROVIDENCE • SAN FRANCISCO • ST. LOUIS • TOLEDO

American Mineral Spirits Company, Dept. CE-7
230 North Michigan Avenue
Chicago 1, Illinois

Please send information on the complete line of Amsco petroleum-base solvents to:

Name .....

Position .....

Company .....

Street Address .....

City .....

State .....

(Samples sent on request)

When you require intricately shaped stainless steel equipment, bring your drawings to a fabricator who has had *special* experience in producing difficult shapes.

The fabricating of stainless steel requires skill even in the making of standard shapes. When odd shaped vessels are constructed, even greater skill is required. Your fabricator must have special tools and dies, tested manufacturing techniques and above all long experience with the behavior of stainless steel during fabrication to produce vessels that give maximum efficiency—longer life for your application.

S. Blickman, Inc. works *exclusively* with stainless steel and alloys—has been doing so for many years. Our engineering experience—our production techniques—our specially equipped plant—may help *you* solve the problems of getting better-built processing equipment in odd shapes. Consult with us.

S. BLICKMAN, INC. • 601 GREGORY AVENUE, WEEHAWKEN, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

definitely increasing. This is not to say that France is really prosperous, but certainly her position is better than it has been for a long time past, and given some political stability many of her problems should shortly be solved and her record of achievement continued. Her chemical process industries, for example, are now producing at 30 percent above their 1938 level.

Robert S. Aries, R. S. Aries & Associates, before Association of Consulting Chemists and Chemical Engineers, New York, Oct. 26, 1948.

MANAGEMENT

Hopes

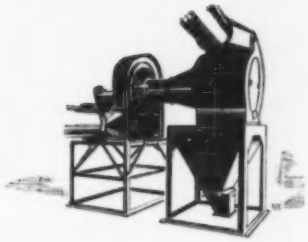
James A. Rafferty

WHAT does the future hold for chemical industry, this relatively new activity of civilized man. The advance in one lifetime has been so great and the acceleration in recent years has been so rapid that we can be sure that it is a movement which is gaining momentum. The well being and national safety of peoples is in proportion to the success and extent of their industries, of which the chemical industry is an important one.

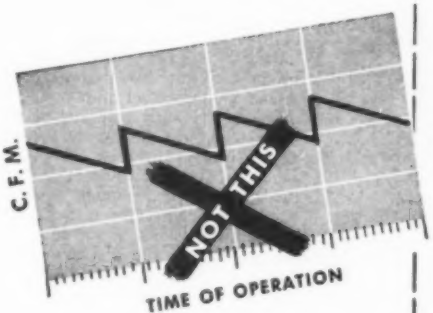
It is evident now to all that the well planned and well executed products of applied science are far superior to the naturally occurring materials which were never designed for the uses to which they were adapted, in the absence of anything better. The word "synthetic" has lost its opprobrium. Accordingly, the chemical industry of tomorrow must feel the responsibility which accompanies the high honor it now has. Products which were once questioned as to acceptance have today won the field and the consumers are no longer willing to return to former sources of supply with their attendant economic disadvantages. Furthermore, we cannot even stand still. We have assumed major responsibilities for raising the standard of living in peace and for national defense in time of emergency. Current social movements indicate a higher living standard is to be expected throughout the world and what was once the luxury of the few is now becoming the necessity for all.

The necessity of utilizing the vast deposits of lower grade raw materials is widespread, as the limited deposits of high grade raw materials are being consumed. This is particularly true of metallurgy in all its branches. Similarly, our liquid petroleum deposits are shrinking in proportion to consumption and the chemical industry will be called upon to convert less easily treated carbonaceous deposits

Continuous dust control demands constant air volume



Roto-Clone's uniform air delivery assures constant effective control at dust source



THE two charts at left tell an important story. The one above shows how rapidly air volume declines as ordinary type collectors become clogged with dust. Result—constantly varying exhaust volume with parallel variations in effectiveness of control at point of dust generation.

Now examine the chart below. This is a Roto-Clone* at work. Constant air volume is exhausted hour after hour, day in and day out. Continuous high efficiency dust collection is assured without a minute's time out for unit maintenance.

The Roto-Clone method of dust control applies centrifugal and dynamic forces in combination to remove the dust particles from the air stream. There are no collecting elements to clog or clean. Dust is discharged automatically for easy removal without interference to operation.

If you want to put dust control on a continuous high efficiency basis, you will want to put Roto-Clone with its small space requirements on the job. There's a type and size for every service. For complete information, contact your local AAF representative or write direct for copy of Bulletin No. 270-A.

**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precicipitator types.*

AMERICAN AIR FILTER CO., INC.
326 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

As manufacturers of an extensive line of Filter Cloth our analysis of and recommendations for your filter media problems would be unbiased . . . we "grind no ax" for any particular cloth.

Each of the cloths listed offers different operating advantages. Each type has its own range of chemical resistance, its own temperature limits and its own degree of resistance to moisture, molds, fungi and bacteria. We would be able to recommend a filter cloth that will give you the best service in your particular filtration operation.

Literature and test samples are available on request.

National Filter Media Co.
Sales Division of FILTER MEDIA CORPORATION
1717 DIXWELL AVENUE • NEW HAVEN 14, CONNECTICUT

SALES OFFICES

Felt Building
Salt Lake City 1, Utah

2627 West 19th Street
Chicago 8, Illinois

1717 Section Road
Cincinnati 16, Ohio

Nicolai Friis
Raviartradet 9
Oslo, Norway

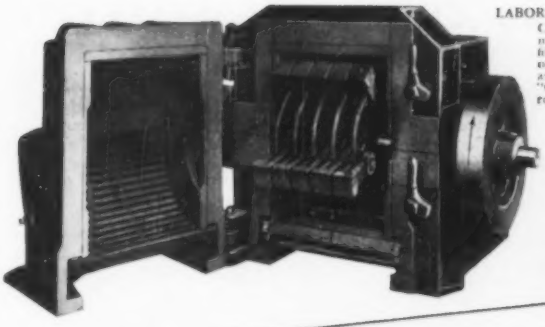
Edward L. Bateman Ltd.
Fox Street
Johannesburg
South Africa

to make them available as motor fuel. High grade lumber is in short supply and the plastics industry must aid us, first, supplementing and eventually replacing wood for many uses. With the world food shortage and the growing population, the question arises as to whether we can long afford to use crop land for producing industrial raw materials.

There are other possibilities which seem more attractive, whereby our industry can continue its course of providing better things which are not now demanded, because they are little known. The construction field is one, much in the public mind today and one need not spend a great amount of time investigating this subject to find that the methods and materials were frozen long before the day of an aggressive chemical industry. To make our homes and buildings as modern as our motor cars is a huge task, but one well worth doing, and we must take the lead. The damage done by fire each year in our country is a serious loss which all must bear. As long as fortuitously occurring natural materials are used extensively, this will continue to be the case. However the scientific basis is already laid for the large scale production of non-flammable synthetic materials to replace the flammable ones now used. The damage done by rust and corrosion is also enormous. Stainless steels have provided the first bulwark in the fight on this ravage and better, as well as less costly, corrosion resisting alloys certainly will be forthcoming. As another illustration, our agriculture is one of our less progressive industries, at least chemically. Steps are already under way to remedy certain difficulties by the use of herbicides, fungicides and insecticides on an experimental basis and this can advantageously go much further.

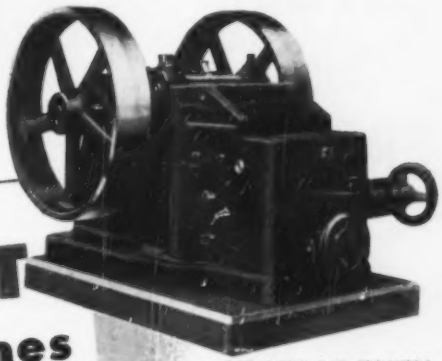
The ever-present human problem can be solved by management developing a sincere democracy of spirit that radiates mutual respect between the manager and the managed. In other words, we must try to enlist the complete man—his emotional as well as his physical and mental capacities. Our American chemical industry, thus far, has benefited tremendously from the enthusiasm of all the pioneers who have been privileged to work in the ever-stimulating atmosphere of American free enterprise. Much good has also derived from the success of some skillful managers in selecting, training, and guiding men and women through the thrills, as well as the pitfalls, of worthwhile creative work.

James A. Rafferty, Union Carbide and Carbon Corp., before American Section, Society of Chemical Industry, New York, Nov. 5, 1948.



LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



STURTEVANT

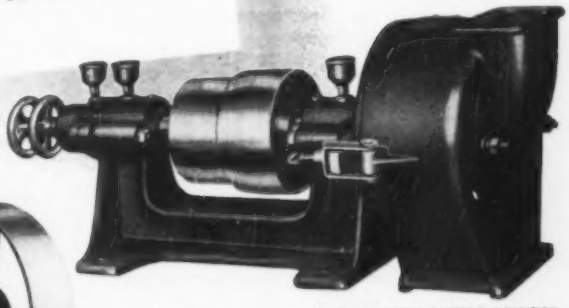
Laboratory Machines

Assure Quality of Products

Fast - Economical - Accurate

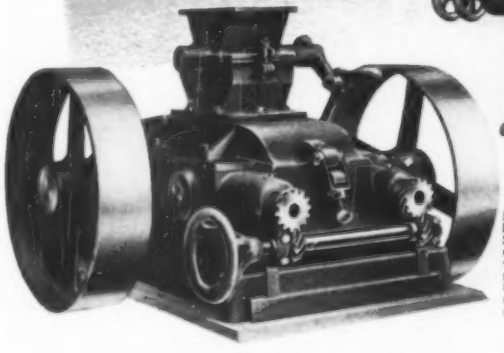
LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.



LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.



LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ⅝ in. to 20 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY

100 CLAYTON STREET, BOSTON 22, MASS.

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

WANTED:

YOUR SPRAY PROBLEMS!

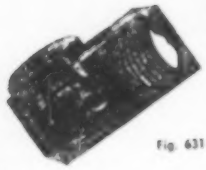


Fig. 631

Are all of your processes using Spray Nozzles as efficient as you think they could be? Do the Sprays distribute the liquid evenly? Break it up into as fine particles as you would like? Resist the corrosion or wear conditions satisfactorily?

Send Monarch an outline of any spray problem—If your liquid can be sprayed with direct pressure at all—Monarch can furnish the nozzles.

NOZZLES FOR:

- ACID CHAMBERS
- AIR WASHING
- CHEMICAL PROCESSING
- COOLING PONDS
- DESUPERHEATING
- GAS SCRUBBING
- HUMIDIFYING
- OIL BURNERS
- SPRAY DRYING

Do you have our Catalogs 6A and 6C?

MONARCH MFG. WORKS, INC.
2513 E. ONTARIO ST.
PHILADELPHIA 34, PA.

FOREIGN LITERATURE ABSTRACTS

New Packing Materials

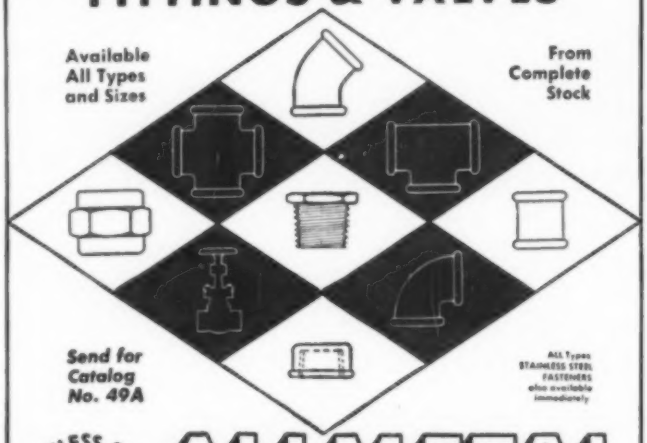
GROWING importance and increasing use of non-metallic building materials in distilling and rectifying operations has led to the development and use of new types of packing materials in recent years. Selection of specific forms and dimensions gives advantages in charge capacity, operation, and pressure loss, or in several of these simultaneously. The latter are influenced by a number of simultaneously active and therefore overlapping factors. Only experimental results can provide a sure criterion of the quality of a packing material and experiments were therefore conducted to make a comparison between new and known packing materials. A study was made of the action and pressure loss of new packing materials, that is, of longitudinally and transversely grooved stoneware rings, porcelain spools and stoneware-star packing materials. It was found that the action of Raschig rings is not surpassed by any of the new packing materials. The basic number of comparison decreases with increasing vapor velocity both in the case of 8 mm. Raschig rings and of star packing material. A maximum value for this number was not attained. There was a pressure loss of 152 mm. H_2O per m. with the most favorable charge for the above rings and a pressure loss of 44 mm. H_2O per m. for the star packing material.

Digest from "New Kinds of Packing Materials and Their Evaluation" by Emil Kirschbaum, *Angewandte Chemie* B 20, No. 8, 197-200, 1948. (Published in Germany.)

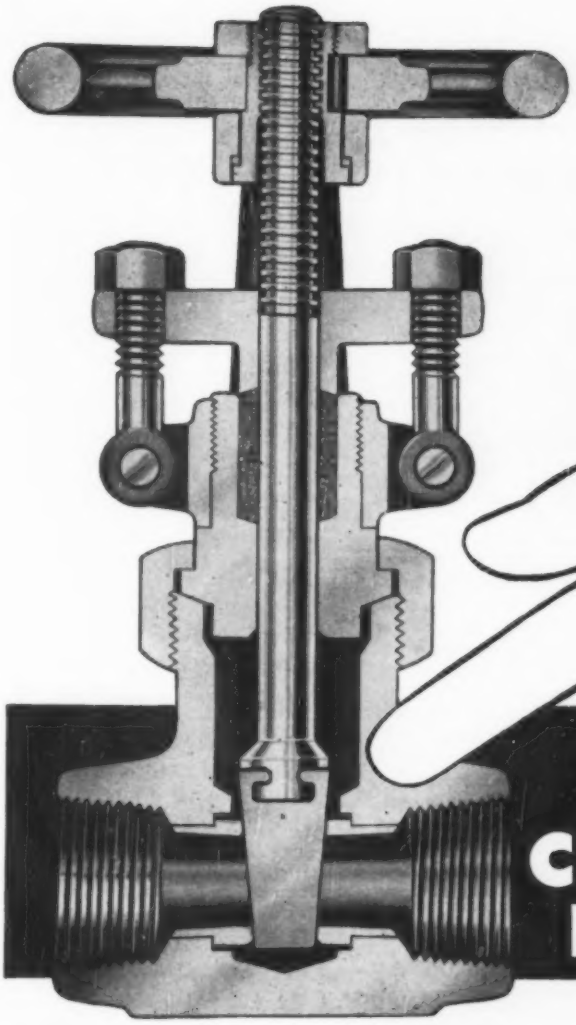
Water and Oil Absorption Of Wood Plastics

LAMINATED wood plastics absorb comparatively large quantities of water so that bearings with bushings made of such plastics have a reduced starting moment and can work reliably under high specific pressures with low velocities and impact loads. They expand on absorption of water, however, and have to be mechanically prevented from expanding in order to preserve the original dimensions of the bushings. It is therefore necessary to know the degree of water and oil absorption and the change in the dimensions of the wood plastics, as well as the stresses which arise. A method for making

• PROMPT DELIVERY •
STAINLESS STEEL FITTINGS & VALVES


Available All Types and Sizes
From Complete Stock
Send for Catalog No. 49A
All Types STAINLESS STEEL FASTENERS also available immediately

STAINLESS STEEL FASTENERS
ALLMETAL Screw Products Co., Inc.
33 GREENE STREET, NEW YORK 13, N. Y.



Super-hardened Discs

mean years of extra wear

CHAPMAN LIST 960

LONG WEAR is built right into this sturdy Chapman gate valve. Stem, seat rings and plugs, for instance, are made of stainless steel for maximum resistance to corrosion. And for maximum wear resistance discs are not just hardened *but are super-hardened by Malcomizing.*

But that's only part of the story. The body is made of forged steel for extra toughness. And you can repack these Chapman valves under full pressure. These features all add up to longer endurance . . . years more of trouble-free service.

Made in sizes from $\frac{1}{4}''$ to $2''$ — carbon steel for pressures to 800 pounds and alloy steel for working pressures up to 1000 pounds at 750°F. For higher pressures, specify List 990.

THE CHAPMAN VALVE MFG. CO.

Indian Orchard, Massachusetts

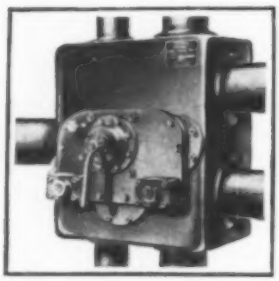
Now Available

COCHRANE

ZEOLITE SOFTENERS & FILTERS

with HYDROMATIC

SINGLE CONTROL VALVE



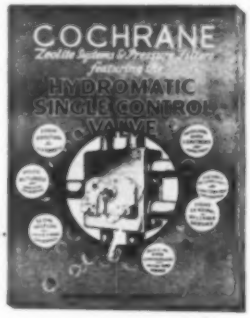
SUMMARIZED FEATURES

1. Four normal positions —Two standby
2. Pilot-actuated for smooth shock-free operation
3. Slow motion eliminates hydraulic shock
4. Compact, built-in Rate Controllers for wash or rinse
5. Tight Seating Valve prevents leaks

Simplifying valve operations by integrating the functions of the usual valve nest in one single control valve, Cochrane Corporation introduces the Cochrane Hydromatic Single Control Valve. The valve is, in effect, a six-position valve with four normal and two standby positions. The functions of the valve, the power for which is provided by the raw water itself, are smooth, positive and free from shock, and the single lever turns with ease. The Cochrane Hydromatic Valve is standard equipment on Cochrane Zeolite Softeners and Pressure Filters, and may be arranged for manual or automatic operation.

Write for a copy of publication 4460
COCHRANE CORPORATION
Philadelphia 32, Penna.

COCHRANE



COCHRANE CORPORATION
5133 N. 17th St., Phila. 32, Pa.
Please send us a copy of Publication 4460

Name _____ Title _____
Firm _____
Address _____
City _____ Zone _____ State _____

these determinations was developed by experiments with four types of laminated wood plastics differing from one another in the distribution of the fibers of the plywood and its thickness. The samples used were 15 x 15 x 15 mm. and the tests on free water absorption and expansion were conducted in neutral water at 50 deg. during a period of six days. Free oil absorption and expansion was determined in dehydrated oil at 50 deg. during a period of 40-50 days. Directional water absorption was determined by covering all sides of the sample except the one under investigation and the experiment conducted until no more water was absorbed. Water absorption during restricted expansion was investigated in special cells at 20 deg. during a period of 20 days. The stresses of expansion from water absorption were determined on specially constructed equipment during a period of 40-50 days.

Digest from "Method of Investigation of Water and Oil Absorption of Wood Plastics" by J. G. Gallay and M. A. Rudnik, *Zavodskaya Laboratoria* XIV, No. 8, 949-953, 1948. (Published in Russia.)

Synthesis of Lubricating Oils

Considerable work was done on the synthesis of lubricating oils using boron fluoride and its compounds as catalysts. Propene can be polymerized by boron fluoride at ordinary temperature and raised pressure to yield a yellow oil with high viscosity. The rate of this polymerization can be increased by the addition of small amounts of water and hydrofluoric acid. Ethene is also polymerized by boron fluoride, forming an oil which has a varying viscosity depending on the conditions of the reaction. The addition of a fine nickel powder appears to accelerate the reaction considerably and improve the quality of the oil. The resulting oils smoke on exposure to air since they contain 5-5.5 percent BF_3 which, apparently, forms a double compound with the polymers. The boron fluoride can be removed from the oil by heating and thereby recovered quantitatively. The degree of polymerization of ethene with BF_3 depends on the pressure used, the yield being much higher with increase in pressure. Lubricating oils could be synthesized by polymerization of olefins, obtained from cracking of paraffin, with BF_3. Polymers with the properties of lubricating oils are also obtained by treating hydrocarbons of the acetylene series with boron fluoride.

Digest from "Compounds of Boron Fluoride as Catalysts in Alkylation and Polymerization Reactions" by A. V. Topchiev and J. M. Paushkin, *Uspekhi Khimii* XVI, No. 6, 664-689, 1947. (Published in Russia.)

DEFEAT CORROSION

...WITH TYPE 316 AUSTENITIC CHROMIUM-NICKEL STAINLESS STEEL

Heat exchanger tubes furnished by Peter A. Frasse and Co., Inc., N. Y. 13, N. Y., in Type 316 chromium-nickel-molybdenum stainless steel.

Here's a heat exchanger for use under highly corrosive conditions.

The tubing is fabricated from one of the most useful corrosion-resistant alloys ever developed . . . Type 316 stainless steel . . . containing 16 to 18 per cent chromium, 10 to 14 per cent nickel, and 2-3 per cent molybdenum.

Like the other austenitic chromium-nickel stainless steels this type can be cold formed and welded with ease. It is often specified for continuous service under severe corrosive conditions.

The application shown above is only one of many examples . . . indicating how austenitic stainless steels are used to assure long, dependable performance in process industries.

Investigate all the benefits stainless steels can give you. Leading steel companies produce austenitic chromium-nickel stainless steel in tubular, sheet and strip form. A list of sources of supply will be furnished on request.

MORE SCRAP-MORE STEEL
Move Your Scrap Now!

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

FACTS ON FILTERING

Representative case histories on widely varied clarification problems condensed from field reports of Johns-Manville Filtration Engineers

Plastics Solution Flow Rate Increased

(reported by J-M Eng. E. J. Weaver)

This chemical company was filtering a highly viscous solution in connection with their plastics production, and was obtaining poor flow rates through the filter.

I suspected that the centrifugal pump they were using in their filter operations was not developing sufficient pressure, and suggested the use of a positive displacement pump instead. With this new pump, I was gratified to learn later that they obtained good clarification and good flow rates on the basis of my suggestion.

$3 Bag of Super-Cel Returns $57.40 Profit!

(reported by J-M Engineer H. G. Martin)

Recently, one of my customers phoned, asking if we could increase their grape pressing yield in gallons of juice and in time saved. If so, they wanted me to show them how to do it.

They place 192 lbs. of Concord grapes in a steam-jacketed cooker, stems and all, with about 1 gal. of water. Steam is applied, and after cooking, the free juice is drained from the bottom.

Before the juice was drained, I added one pound of Hyflo Super-Cel (about ½% by weight of grapes) and stirred it throughout the mass. After a thorough stirring, the mixture was placed in cheese racks under the hydraulic press.

Previously, without Hyflo, the pressing operation had taken 16 minutes. With Hyflo, the press closed completely, producing a dry cake in nine minutes. Instead of requiring a total pressure of 1100 lbs. psi, the press was finished at 600 lbs. psi. There was no slippage of the frames, the cloths cleaned better, and there was no breakage of cloths. In addition to this, the final yield of juice was so much greater that each $3.00 bag of Hyflo used resulted in an overall profit of $57.40.

Needless to say, the use of Hyflo will not stop with the grape presses, but will be standard for all their fruit jelly juices.

Engineering Help Rectifies Filter Problem At Swimming Pool

(reported by J-M Engineer T. A. Fuess)

Here was a new installation of an 80 sq. ft. unit at a municipal swimming pool.

The water was filthy, the pool scummy, and the filter cycle was from 1 to 1½ hours. Inspection of the filter showed a pressure of 40 psi after 30 minutes' operation. The elements were about 50% bare, and clogged with slime. The operator stated that he had precoated with 10 lbs. of Celite Filter Aid, but that the powder would not place itself evenly on the elements.

We cleaned the filter, and removed the slime from the elements by "bumping" the cake off—first by closing the wash outlet, keeping the wash inlet valve open with pump running, and then quickly opening the outlet. About a dozen bumps at 60 psi, with subsequent drains, cleaned up the elements to a fair condition.

We then precoated with 10 lbs. Celite. After fifteen minutes' recirculation a well-formed precoat was obtained. After four hours, the filter was operating at 40 psi under a completely open inlet valve. It appears that their filtration problems are over.

Gets Premium Price for Strawberry Juice Filtered with Celite 545

(reported by J-M Eng. Scott Robbins)

A few months ago, one of my customers purchased a 26 sq. ft. filter to be used in reclaiming syrup used in the treatment of maraschino cherries.

At the particular time the filter arrived, strawberries were in season, and they put it in operation on strawberry juice using Celite 545. The new filter did an excellent job, and they were able to get a premium for this juice from the jelly manufacturer.

In fact, customer was so pleased with the results obtained that they are planning to extend the use of Celite to many of their other operations.

Let Your J-M Engineer Help You With Your Filter Problem

Johns-Manville Filtration Engineers can usually help you solve a filtration problem right on the job, often by suggesting a few simple changes. They may find that a slight change in equipment, operating technique, method of adding filter aid—or a change to another type of filter aid will increase production without affecting filtrate quality. If you are having trouble getting clarity or if your filter station is a "bottleneck," get in touch with your local Johns-Manville representative, or write to Johns-Manville, Box 290, New York 16, N. Y.

Johns-Manville JM PRODUCTS

Celite **Filter Aids**

Reg. U. S. Pat. Off.

CHEMICAL ENGINEER'S BOOKSHELF

Lester B. Pope, ASSISTANT EDITOR

European

DISTILLATION AND RECTIFICATION. *By Emil Kirschbaum. Translated by Max Wulfinghoff. Chemical Publishing Co., Brooklyn. 426 pages. $10.*

Reviewed by Donald F. Othmer

WHEN the German edition of this book was published in Berlin in 1940, it was (and still is) the finest presentation of distillation theory and practice which has been printed in Europe. This translation was done privately several years ago for the Vulcan Copper & Supply Co. of Cincinnati, Ohio, for their own reference use in connection with the design of distillation equipment. Unfortunately, the publishers have not seen fit to have the figures re-drawn and labels translated; and thus all figures are reproduced directly from the German edition. Beneath each figure is a German-English vocabulary for the words appearing on the figure. The drawings themselves are excellent, but their use is confused by this unworkmanlike presentation. Similarly, and in order to keep the text in harmony with the figures, all units throughout have been retained in the metric system of the original. Vapor velocities are thus in meters per second, all other dimensions are in meters and millimeters, heat quantities are in calories, etc. Some other aspects of the editing, e.g., the method of dividing into sections, the unalphabetized bibliography, etc., also seem strange to readers of American technical books. All of these mechanical defects might well have been eliminated by the publishers in charging approximately 2½c. per small page for a book on which the author's charges have been erased by the Alien Property Custodian.

The presentation of Kirschbaum in a careful and excellent translation is still there, however, with his careful pedagogy in developing from the basic physical chemical principles along his own pattern. This is different from any American development, and valuable thereby, since it covers some points usually missed and gives a new slant on the whole. The development of theory in conjunction with plant processes and equipment is most practical; but, in some cases notes are to be made of the differences of American processes and equipment. All in all, this is one of the most useful books on distillation yet published; and while it makes an American engineer stop and re-read now and then because of the difference of approach (and sometimes conclusion); that by itself may be one of its most valuable contributions. It will be a handy book, indeed, for reference in academic courses in distillation; and a necessary addition to the bookshelf of every distillation engineer.

Contribution

PRINCIPLES OF HIGH-POLYMER THEORY AND PRACTICE. *By Alois X. Schmidt and Charles A. Marlies. McGraw-Hill Book Co., New York. 743 pages. $7.50.*

Reviewed by Paul F. Bruins

A DISTINCT contribution to the literature of chemical engineering has been accomplished by the new book of Schmidt and Marlies. This book is very comprehensive in its coverage of all fields of high polymers, including fibers, plastics, rubbers, coatings, and adhesives. It is outstanding in its approach to the problem of covering a new field which has been rapidly developing in the last 20 years. It brings together for the first time both the theory of high polymers and many examples of industrial application.

For the serious student this book provides a valuable tool for preparation in entering the field of high polymer production and utilization, in giving him a thorough understanding of the principles involved.

As is indicated by the title, the book is essentially one of stating principles in these diverse but interrelated products and, hence, cannot be expected to serve as a guide for details of industrial practices. Thus, if it is desired to secure definite information with regard to the manufacture of any individual resin or industrial practice with regard to compounding or fabrication, the reader will have to look elsewhere. The book is an excellent guide for reference material, including an appendix which classifies polymer literature into topical groups for ready reference.

While the book is recommended for use either on the undergraduate or graduate level, it appears that it will be most useful as a textbook in a graduate course in high polymer chemistry.

Pharmaceuticals

DRUG RESEARCH AND DEVELOPMENT. *Edited by Austin Smith and Arthur D. Herrick. Revere Publishing Co., New York. 596 pages. $10.*

Reviewed by Darwin Vexler

SMITH, Herrick, and some 18 collaborators set out to make generally available a good over-all working knowledge of the procedures used in developing and marketing pharmaceuticals, particularly from the drug manufacturer's point of view. They have succeeded admirably.

Descriptive works of this sort fill a long-felt want. It will usually take a man in most positions even within the industry some four or five years before he is able to pick up any kind of broad understanding of what goes on outside his special bailiwick. "Drug Research and Development" might well be required reading in training programs for new employees throughout the industry. Even mature workers, their attention concentrated on the operation of their own divisions, sometimes feel the need of an easy way of learning about

RECENT BOOKS RECEIVED

The Chemical Arts of Old China. By Li Ch'iao-p'ing. Journal of Chemical Education. $5.

The Chemical Technology of Dyeing and Printing. 2nd ed. By Louis Diserens. Reinhold. $11.

Design of Industrial Exhaust Systems. By J. L. Alden. Industrial Press. $3.50.

Mendeleyev. By D. Q. Posin. Whittlesey House, McGraw-Hill. $4.50.

Practical Spectroscopy. By G. R. Harrison, R. C. Lord and J. R. Loofbourow. Prentice-Hall. $6.65.

Science at War. By J. G. Crowther and R. Whiddington. Philosophical Library. $6.

Vacuum Manipulation of Volatile Compounds. By R. T. Sanderson. Wiley. $3.

Simple and effective, this Patterson System is ideal for defrosting installations having two or more evaporators in one refrigeration system. Operations are cyclic and can be either automatic or manually controlled. In addition to properly defrosting each evaporator, this PATTERSON SYSTEM protects the compressor by intercepting any slugs of refrigerant and changing the liquid into gas. It precools the refrigerant. It promotes higher efficiency in the system.

With proper modifications, usually it can be applied to the defrosting of a system with only one evaporator.

Back of this Patterson Defroster is an experience in the design and manufacture of equipment for refrigeration systems dating back many years. It's one of our latest contributions to progress in the industry. In sending for our new bulletin on the PATTERSON Defrosting System, give details of your installation and problem.

THE PATTERSON-KELLEY Company Inc

WARREN STREET, EAST STROUDSBURG, PA.

New York Office: 109 Park Avenue, Zone 17

Offices or Representatives in Principal Cities

currently used methods outside their specialty. Certainly most people feel more comfortable when they know, generally speaking, what is transpiring in a whole field. And probably, as the book suggests, such knowledge helps a man to make his best contribution to the work.

While it is felt that the book will find its greatest acceptance within the pharmaceutical industry and in schools directly concerned with training men who are to enter pharmaceutical work, its interest is by no means limited to that field. Anyone who comes into contact with the drug field as a supplier, consultant, or customer, will probably find it useful.

Most of the subject matter is almost purely descriptive and all of it appears well-chosen. In so wide a purview as is taken by this book this is a considerable achievement. Some discussion on the part package standardization and inventory control might play in package development might have been included—but other readers would probably choose other items for inclusion.

A few expressions of opinion which might be regarded as controversial do occur. Some long and interesting arguments might, for instance, arise on Smith and Herrick's concept of the chief reasons for the recent phenomenal gains in the development of effective pharmaceuticals.

Gathering a group of experts of the caliber of the authors was in itself no mean feat. They have put together a work that possesses rather surprising continuity. It is written in good, clear, understandable English, with most of the technical terms unique to a specialty defined as they are used—for which the reviewer was, on occasion, grateful. There is a good index and a brief, highly selective bibliography.

For Educators

EDUCATION FOR PROFESSIONAL RESPONSIBILITY. *A report of the Inter-Professions Conference on Education for Professional Responsibility, Buck Hill Falls, Pa., April 12-14, 1948. Carnegie Press, Carnegie Institute of Technology, Pittsburgh, Pa.*

Reviewed by H. C. Parmelee

BELIEVING that many of the problems of professional education are common to all professions, a small group of educators conceived the idea of holding an inter-professions conference for exchange of experience and ideas. The volume under review contains the formal papers there presented. It was a small conference, purposely limited to the five professions whose members planned it—

NEW CLOSE-CUT SOLVENTS SPEED PRODUCTION, CUT COSTS IN SCORES OF INDUSTRIES

Esso Hexane, Heptane and Octane Now Provide Boiling Ranges of 7°F. to 15°F.

Esso Standard Oil features three very narrow cut, commercially pure, aliphatic solvents, available at prices as attractive as those solvents with much wider boiling ranges.

Known as Esso Hexane, Esso Heptane and Esso Octane, these three new solvents have boiling ranges spreading over 7°F. to 15°F....with initial boiling points of 154°F., 205°F., and 225°F., respectively. In addition to their narrow boiling ranges, these new solvents show +25 Saybolt color, pass doctor and corrosion tests and are of such high purity as to be accepted as commercially pure hydrocarbons. The new Esso Solvents offer manufacturers a uniform drying rate, less solvent retention, and less residual odor than solvents with wider boiling ranges.

Boon to Seed Oil, Rubber and Textile Manufacturers

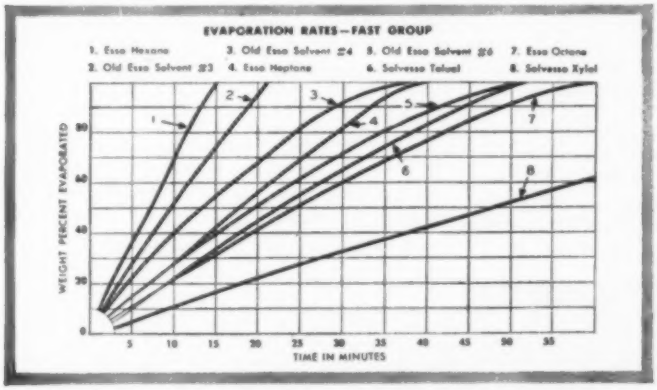
Because it is a selective solvent for vegetable oils, Esso Hexane is gaining wide acceptance in soybean and cotton seed mills using the solvent extraction method. It is also proving highly economical, both because of its low initial cost and because its high normal hexane content permits re-use indefinitely without deterioration.

Manufacturers of rubber goods find the new close-cut Esso Solvents desirable in the manufacture of rubber gloves and other products requiring a fast-drying rate. In the textile industry these fast-drying naphthas are more desirable than many other solvents in dissolving rubber to make the cement used as proofing. In using the new products, makers of print goods find that designs come out clean and sharp, and dry almost as quickly as the goods leave the printing rolls.

Manufacturers of rubber shoes, bathing caps and similar products now have a wide choice of Esso Solvents for use in coatings.

Esso Solvents Available in Wide Range of Evaporation Rates

The new and improved Esso Solvents described above and other solvents in the Esso line enable you to select the product with the precise characteristics you require. For further information on the specifications and characteristics of Esso Petroleum Solvents, write or call our office nearest you and our technical men will be glad to assist you.



These curves illustrate the improved evaporation rates at room temperature of Esso Hexane, Esso Heptane and Esso Octane over a number of other solvents.

EVAPORATION RATES IMPROVED ON ESSO VM & P NAPHTHA

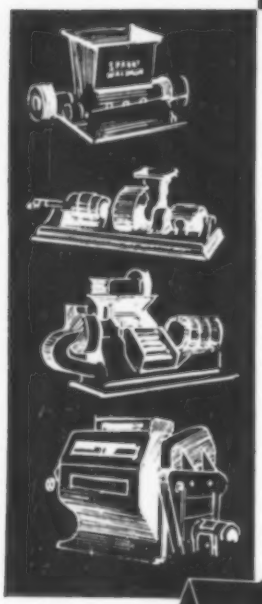
Esso VM & P Naphtha has been reduced to a 45°F. range, with a 245°F. initial boiling point and a 290°F. dry point. The net result of this narrower range means reduced evaporation loss in storage and speedier processing through elimination of slow-drying residues. Improved Esso VM & P Naphtha is proving of great benefit to manufacturers of traffic paints, rotogravure and textile printing inks, and to tanners who use it in degreasing leather.

ESSO PETROLEUM SOLVENTS

Sold in Me., N.H., Vt., Mass., R.I., Conn., N.Y., Pa., N.J., Del., Md., D.C., Va., W.Va., N.C., S.C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY—Boston, Mass. New York, N. Y.—Elizabeth, N. J.—Baltimore, Md. Richmond, Va.—Charleston, West Va.—Charlotte, N. C.—Columbia, S. C.—Memphis, Tenn.—Little Rock, Ark.—New Orleans, La.

ESSO STANDARD OIL COMPANY OF PENNSYLVANIA—Philadelphia, Pa.



GRANULATING, pulverizing, defiberizing, crushing, or cutting—whatever you call it, **if it's size reduction,** Sprout-Waldron can help you.

Water softening granules from ion exchange resins . . . a cottony fluff from sheet pulp . . . moulding stock from continuous sheet thermoplastics —these are typical applications in which Sprout-Waldron experience and equipment have been outstanding.

Every day S-W Engineers are transforming new and varied size reduction problems into more profitable operations. Whether your processing calls for the usual or the unusual approach, first learn what Sprout-Waldron can do for you!

Outline your size reduction problem today! Contact Sprout, Waldron & Co., 15 Waldron St., Muncy, Pa.

SPROUT WALDRON
Manufacturing Engineers
MUNCY PENNSYLVANIA

69

divinity, medicine, law, engineering, and business. Those participating were chosen primarily for their interest in improving professional education, and not because of their positions.

The diversity of the professions represented and the scope of the program make it practically impossible to give an adequate review within the space available. At each of three sessions, members of the five professions discussed (a) the objectives of professional education, (b) content and method in professional education, and (c) social and humanistic aspects of professional education. The papers abound in detail, and must be read, studied, and annotated for maximum benefit. Those engaged in general, as well as professional, education will be richly rewarded for the time spent in correlating the views of forward-looking men who realize that the excellence of technical education is not yet matched by the social training essential for the maximum development of professional leaders.

Among the areas of general agreement in the conference, emphasis was placed on the necessity for continuing examination of the objectives and methods of professional education if it is to meet the challenge of a changing world. Curricula must be reviewed. Methods of instruction must be tested and revised. A sense of responsibility to society must be inculcated in professional men who, presumably, comprise the best educated group in a community. And some means must be found to persuade them to participate in social, economic, and political activity if our best democratic institutions are to be preserved.

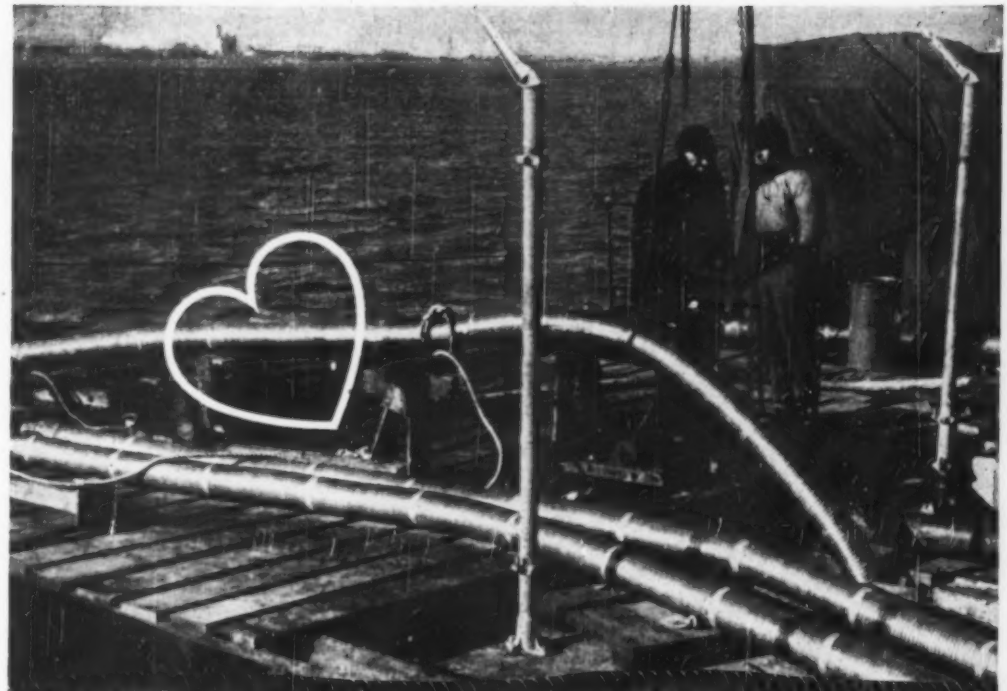
On the whole, the conference was stimulating to its members; and its recorded proceedings will be equally provocative of thought and action to all who are engaged in the process of making responsible members of society out of lawyers, ministers, business men, doctors, engineers, and other professional groups.

Making Fuels

CONVERSION OF PETROLEUM. *2nd Edition. By A. N. Sachanen. Reinhold Publishing Corp., New York. 602 pages. $11.*

ENGINEERS and petroleum technologists familiar with the 1940 edition of Sachanen's well-known reference work will welcome this second edition which brings the subject up to date (as of late 1947, which is remarkably good considering the time necessary to prepare and print a book manuscript).

The chapters on conversion of petro-



BEATS THE HEAT AT CABLE CROSSING

Penflex "Flexineering" helps solve problem of cooling power cables at river crossing

Cooling and protecting eight under-water power cables as they emerge from the water's edge into the shore terminals was a man-sized problem—until Penflex Engineers, teamed with the construction company, furnished the right answer—flexible cooling jackets.

Long sections of 3½" dia. bronze Penflex hose encase each cable from river's edge to the terminal. These were permanently centered in 6" dia. sections of the same length. After sealing both ends of the units, water was circulated through the 6" sections, forming tight, flexible jackets that keep cables cool and protected. Tailor-made by Penflex, these units were easily installed, saving man-hours, cutting costs.

Streamlined for quick service, Penflex "Flexineering" can help solve numerous flexible tubing problems for machine tool manufacturers . . . construction and road building firms . . . oil refineries . . . shipbuilders . . . power plants . . . and other industries.

Backed by 45 years of engineering know-how, Penflex offers complete service on flexible tubing layout design for your specific needs. Call on Penflex for a full line of flexible metallic hose, tubing, and couplings, from ⅛" dia to 30" dia., in all types, for all uses. Also time-saving automatic barrel fillers, rivet passers. For handy bulletins containing complete information, write today to . . .

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7234 Powers Lane **Philadelphia 42, Pa.**

BRANCH SALES OFFICES—BOSTON • NEW YORK • CLEVELAND • CHICAGO • HOUSTON • LOS ANGELES

Penflex... HEART OF INDUSTRY'S LIFE LINES

Copyright 1948—Penna. Flexible Metallic Tubing Co.

2 NEW WILLSON MONO Goggles

Newly styled plastic eye protection with choice of curved or flat lenses offer new features designed to add to their already predominant popularity. The WILLSON MONOGOGGLE, just over an ounce in weight, is the answer to getting safety equipment worn on many hazardous jobs.

- **The new flat lens design retains all the safety features of the curved lens:**
- **Both provide ample room for wearing of prescription glasses in comfort. The flat style, however, provides additional clearance for molded spectacle frames.**
- **New drop-eye shape gives wider vision.**
- **Greater ventilation area provides better air circulation and more wearer comfort.**
- **Both new designs available in clear acetate frames or the new flexible, mottled-brown, polythene frame.**

WILLSON*

For complete information on these products and their application, as well as other eye and respiratory protective devices, get in touch with your Willson distributor or write us direct.

*T. M. Reg. U. S. Pat. Off.

WILLSON PRODUCTS, INC., 223 WASHINGTON STREET, READING, PA.

leum gases into motor fuels have been newly written and those on reactions of hydrocarbons and synthetic gasolines have been revised and supplemented by new data. References to manufacturing processes have, of course, been greatly expanded to record the remarkable progress made by the American petroleum refining industry during the past seven years of prewar, war, and postwar stress.—*JRC*

Fischer-Tropsch

SYNTHETIC PETROLEUM FROM THE SYNTHINE PROCESS. *By B. H. Weil and J. C. Lane. Chemical Publishing Co., Brooklyn. 303 pages, $6.75.*

FOUR main sections comprise this study of the Synthine process. They are: (1) synthesis gas, (2) catalytic synthesis, (3) products and byproducts, and (4) basic economics. Part one deals with history, production and purification of the raw materials. Part two is concerned with reaction mechanisms, variables and catalysts. (German processes are included here.) Part three covers the multitude of products and byproducts — from gaseous fuels to waxes and lubricants. The fourth part, on economics, covers petroleum, coal and natural gas as raw material and analyzes the current (1947) situation. Appendixes list patents and government reports and give a supplemental bibliography. Subject and author indexes complete the book.

By taking the multitude of literature references, interpreting, correlating, and inserting them into their logical sequence, the authors have performed a real service for all who are interested in any phase of the catalytic hydrogenation of carbon monoxide.—*LBP*

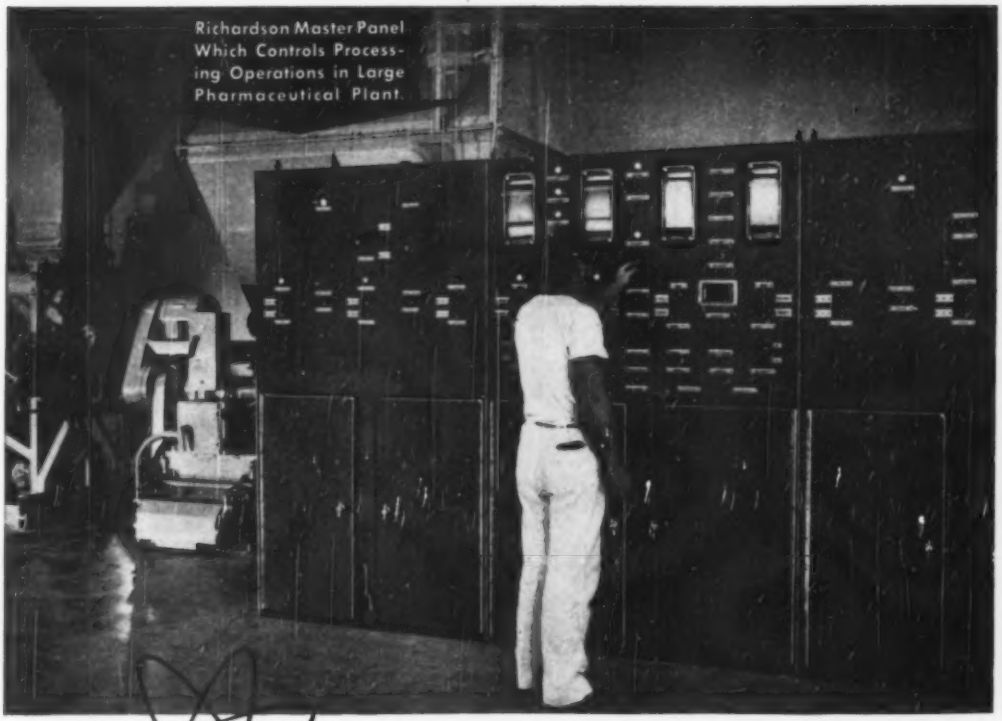
RECENT BOOKS and PAMPHLETS

A.S.T.M. Standards on Petroleum Products and Lubricants (With Related Information). Published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. 745 pages. $5.50. All methods of testing, specifications, definitions, charts and tables issued by ASTM about petroleum. Does not include the methods of test for knock rating of engine fuels.

La Fonderie des Alliages Legers. By R. Perret. Published by Dunod, 92, Rue Bonaparte (VI), Paris, France. 165 pages. 480 fr.

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry. Vol. XXXI-1946, Vol. XXXII-1947. Published by Society of Chemical Industry, 56, Victoria St., London, S. W. 1, England. Vol. XXXI, 745 pages. Vol. XXXII, 518 pages.

British Plastics Year Book, 1948. Published by Iliffe and Sons Ltd., Dorset House, Stamford St., London, S. E. 1.



Richardson Master Panel Which Controls Processing Operations in Large Pharmaceutical Plant.

HAVE YOU A SPECIFIC PROCESS CONTROL PROBLEM?

The chemical and process industries are finding it increasingly essential that today's processing operations be conducted under an accurate, fully automatic control employing electrical, electronic or hydraulic devices.

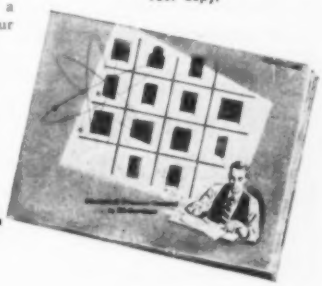
Process control systems, engineered and installed by Richardson, in glass, rubber, chemical and cement plants, pharmaceuticals, distilleries, foundries and scores of other applications, have made processing of products completely automatic and accurate.

"Brain" of the Richardson system is the Master Panel which contains electrical controls for equipment used in processing operations. It distributes impulses to integrate timing, sequence of cycles, material supply, feeding, weighing, proportioning, and discharge of the end product.

Richardson engineers have the know-how to design accurate electrical control for the coordination of processing equipment such as scales, conveyors, skip hoists, elevators, feeders, meters, mixers, sifters, pumps, tanks, bins, etc. They welcome the opportunity to develop controls for processing any dry, ground, granular material or chemical, and liquids, that can be handled automatically.

Write today for Bulletin 6148, or if your need is immediate, ask a Richardson engineer to call at your plant.

Just off press—12-Page Bulletin On Process Control Panels—Send for Your Copy.



PROCESS CONTROL DIVISION

of

Richardson Scale Company • Clifton, New Jersey

Atlanta • Boston • Buffalo • Chicago • Omaha • Montreal • New York
Philadelphia • Minneapolis • San Francisco • Toronto • Wichita

4298

Get more output from your Filter Presses

—by using Cotton Filter Fabrics impregnated with

THORATEX

REG. U.S. PAT. OFF.

- Resists corrosive action of Alkaline and Caustic solutions
- Mildew and rot resistant
- Frequently outlast untreated fabrics three to one
- Fewer washings required
- More continuous press operation
- Maintains filtering capacity
- Smooth surface
- Cakes comes away easily
- Reduces gumming
- Less shrinkage on press
- May be used in cold or boiling filtrations
- May be used with hydrocarbon solvents
- Non-capillary
- Better filtration
- Soft, flexible—sews easily

FREE TRIAL

Send us, prepaid, a roll of your cloth for finishing. Try it under actual plant operations.

Information and samples on request.

SPRINGDALE FINISHING SOUTH, Inc.

Sales office

320 Broadway, New York, N. Y.

Mill: Whitney, So. Carolina

England. 478 pages. Each section is prefaced by a stout tabbed card on which is printed a full index for that section.

The Rubber Industry in Germany during the Period 1939-1945. British Intelligence Report No. 7, published by His Majesty's Stationery Office, London, England. 150 pages. 2s. 6d. Relates basically to the German synthetic rubbers, mainly the bunas and perbunans, references to any other types of rubber being very scanty.

Sugar. Published by the United States Cuban Sugar Council, 136 Front St. New York 5. 159 pages. A fact-packed handbook covering production, consumption, economics and legislation of the world's largest tonnage pure organic chemical.

A.S.T.M. Standards on Copper and Copper Alloys. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. 504 pages. $4.25. Standard specifications, test methods, definitions of terms covering copper and copper alloys, cast and wrought copper and copper alloys for electrical conductors, non-ferrous metals used in copper alloys.

Elementary & Applied Welding. By Herbert P. Rigsby and Chris H. Groneman. Published by the Bruce Publishing Co., Milwaukee, Wis. 151 pages. $2. Material especially adaptable to the beginning student in both oxyacetylene and arc welding.

Design of Machine Elements. By M. F. Spotts. Published by Prentice-Hall, 70 Fifth Ave., New York. 492 pages. $6.65. Basic theories and newer methods presented in chapters which are independent enough to be studied in any order.

Proceedings of the National Conference on Industrial Hydraulics. Published by Armour Research Foundation Center, Chicago 16, Ill. 138 pages. $3. Ten papers presented at the third annual meeting.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering any publications noted in this list always give complete title and the issuing office. Remittance should be made by postal money order, coupons, or check. Do not send postage stamps. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.

Minerals Yearbook Preprints. Publication of minerals data for the calendar year 1947 will be accomplished this year in a new manner. Various technical chapters will be prepared as usual. Then a number of these chapters will be assembled in small leaflets of about 32 pages each. Sometimes the individual booklet will deal with a single subject. In other cases there will be several subjects grouped together, even though the subjects may not be related to each other. A few single chapters have already been released, but the bulk of Minerals Yearbook 1947 will be in the new style.

Publications of the National Bureau of Standards. Circular 460. Price 75 cents. Lists titles and includes brief abstracts, with a voluminous author and subject index.

Workers in Subjects Pertaining to Agriculture in Land-Grant Colleges and Experiment Stations. U. S. Department of

New! **TERRISS 3-SPEED PORTABLE MIXER**

STIRS • BLENDS MIXES • AGITATES

No more carrying heavy mixer . . . clamping to tanks . . . breaking side walls

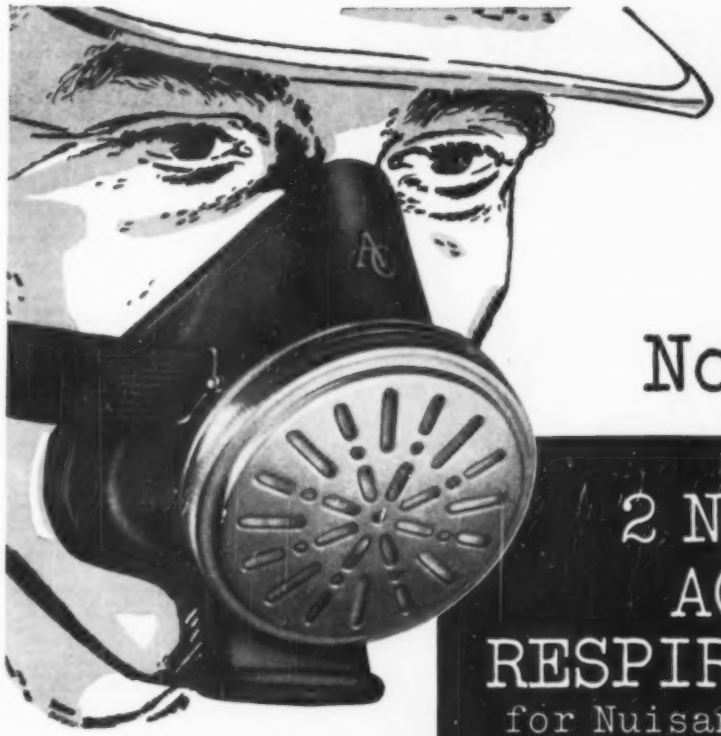
The New TERRISS 3-speed Portable Mixer is an all-around unit that will take care of all your mixing, blending and agitating problems. If your tank or vat is below floor level the TERRISS 3-speed Mixer will reach down and do a real job for you. If your container sits on the floor, a little adjustment and the mixing begins. If your tank or container is high off the floor, TERRISS Mixer will lift up and do the mixing job. All parts that touch your product are Stainless Steel. Standard belt drive permits propeller speeds of 175 RPM, 325 RPM and 575 RPM. Other combinations are available with simple adjustments. Both propeller shaft and stand are adjustable, permitting unlimited settings to fit any job in your plant.

Send your order today . . . money-back guarantee

TERRISS DIVISION OF *Consolidated Siphon Supply Co., Inc.*

MANUFACTURERS SUPPLYING THE PROCESSING INDUSTRIES

Dept. C, 22-24 Wooster New York 13, N. Y.



Now...

2 New AO RESPIRATORS for Nuisance Dusts

R 2900 R 2900A

Comfortable
Positive-Acting
Popularly-Priced

Here are two NEW respirators — the AO R-2900 and AO R-2900A that fill a definite need in applications such as coal yards, grain elevators, cement mills, woodworking plants and some grinding operations — wherever a *sound*, *serviceable* and *economical* respirator is required for combating light concentrations of nuisance dusts. (For protection against pneumoconiosis, silicosis and asbestosis dust hazards, the new, revolutionary R-2000 Respirator is recommended.)

Both the R-2900 and R-2900A are similar in streamlined design to the R-2000. Vision is unobstructed both front and side . . . filter is lightweight and REPLACEABLE . . . retainer cup light and durable. Any face may be fitted comfortably without adjustment and due to the lack of overall respirator weight, workers report no discomfort even when wearing the respirators for long periods. Inhalation and exhalation valves of the R-2900 (the R-2900A has no inhalation valve but is otherwise identical) prevent infiltration of dust while providing easy breathing action. The face masks of both respirators are of highest quality rubber with edges smoothly rounded for POSITIVE SEAL, no tools are necessary for disassembly and the respirators are quickly, easily cleaned. Ask your nearest AO Safety Representative about the complete line of AO dust protection equipment.

American Optical COMPANY — *Safety Division*

Southbridge, Massachusetts • Offices in Principal Cities

Simplify valve selection with this LUNKENHEIMER "RENEWO" THREESOME...

The "RENEWO" Threesome is fully described in Circular No. 577, which also explains the economy feature of converting one type to another by simply changing seat and disc. A copy is yours for the asking . . . from your Lunkenheimer Distributor or from us direct.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

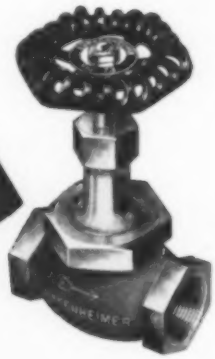
CINCINNATI 14, OHIO, U. S. A.

NEW YORK 13 · CHICAGO 6

BOSTON 10 · PHILADELPHIA 34

EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.

1 REGULAR TYPE...

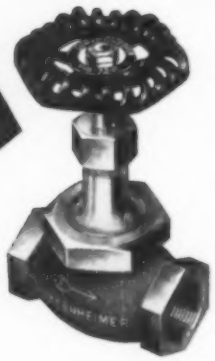


Nickel Alloy Seat and Disc

Fig. 73 200 lb. S.P.
Fig. 16 300 lb. S.P.

Regular "RENEWO": one of the most popular and widely used valves ever designed for general service. As the name clearly implies, all parts are renewable.

2 "P" TYPE...

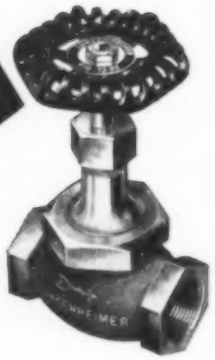


Nickel Alloy Seat and Disc

Fig. 73-P 200 lb. S.P.
Fig. 16-P 300 lb. S.P.

"P" (Plug Type) "RENEWO": for throttling, drain, drip water column blowdown and similar service. The "NSS" Nickel Alloy 330 Brinell seating material, developed and patented by Lunkenheimer, has exceptional wearing qualities and high corrosion resistance.

3 "PS" TYPE...



Nickel Alloy Seat and Disc

Fig. 73-PS 200 lb. S.P.
Fig. 16-PS 300 lb. S.P.

"PS" (Plug Type) "RENEWO": for maximum resistance to the effects of close throttling and other severe service, particularly where abrasive conditions are encountered. Equipped with stainless steel 500 Brinell seat and disc.

Agriculture Miscellaneous Publications No. 649. Price 35 cents. Lists all personnel engaged at all agricultural experiment stations, showing department or scientific specialty.

The European Corn Borer. By W. A. Baker and W. G. Bradley. U. S. Department of Agriculture Farmers' Bulletin No. 1848. Price 15 cents. Deals primarily with farm and field control methods.

Methods of Artificial Respiration. U. S. Coast Guard document CG 139, revision of June 1948.. Price 10 cents. A ten-page training pamphlet with pictures.

Effects of DDT and Other Insecticides on Fish and Wildlife. Fish and Wildlife Service Circular 15. Price 10 cents. Includes recommendations for minimizing danger to wildlife.

World Chemical Developments 1940-46. Part 2. U. S. Department of Commerce Industrial Series No. 81. Price 40 cents. This covers Western Hemisphere and the major chemical-consuming or producing countries of Africa and Asia, supplementing Part 1 (released in January 1948) which covered most of Europe and the major countries in the British Commonwealth.

Rock-Color Chart. 1948. Distributed by the National Research Council, Washington, D. C. Prepared by the Rock-Color Chart Committee including representation from U. S. Geological Survey, the Geological Society of America, American Association of Petroleum Geologists, Society of Economic Geologists, and Association of American State Geologists. Price $5.50 including color chips.

U.S.A.E.C. Personnel Program—Questions and Answers. U.S.A.E.C. Federal Employee Personnel Policy. U. S. Atomic Energy Commission, Nov. 23, 1948. Policy statements in two handbooks.

Parathion in Aerosols for the Control of Pests on Greenhouse Ornamentals. By Floyd F. Smith, P. H. Lung, and R. A. Fulton. Bureau of Entomology and Plant Quarantine, E-758. A summary of information for formulators of aerosols and florists using them.

Automotive Antifreezes. By Donald B. Brooks and Ronald E. Streets. National Bureau of Standards Circular 474. Price 15 cents. Intended primarily for the average individual automobile owner (revised to include new data).

Precision Resistors and Their Measurement. By James L. Thomas. National Bureau of Standards Circular 470. Price 20 cents. This booklet should be of interest to anyone concerned with the accurate measurement of resistance.

Liquid Ammonia as a Fertilizer. By M. S. Anderson. Bureau of Plant Industry. A six-page leaflet including selected references, summarizing the general methods used.

Storage Tests on Conditioned and Wettable Powders Containing 90 Percent of DDT. By E. L. Gooden and R. L. Updike, Jr. Bureau of Entomology and Plant Quarantine document E-753. Describes free-flowing fine-powder formulations containing essentially "undiluted" DDT.

A Second List of Publications on Benzene Hexachloride. By C. V. Bowen. Bureau of Entomology and Plant Quarantine document E-755. This bibliography brings up to July 1948 the list of references issued in July 1947, identified as E-731.

Adhesives for Dilute and Concentrated Cryolite Sprays Used in White-Fringed Beetle Control Operations. By Charles F. Henderson and Irving Keiser. Bureau of Entomology and Plant Quarantine document E-756. A summary of laboratory and field tests and control demonstrations.

The Reclamation Program 1948-54. Bureau of Reclamation. Based on 1947 conditions and subject to Congressional approval.

FAO Bulletin, 1948 Conference Issue. Food and Agriculture Organization of the United Nations, 1201 Connecticut Ave. N.W., Washington 6, D. C. Includes FAO's 1949 program of work.

MANEELY NOW OFFERS

Zinc Chloride

(50% & 70% Solutions. In drums or tank cars.)

Zinc Sulphate

(Powder in 100 lb. bags.)

Made by a new process, in the newest and one of the most efficient, modernly equipped chemical plants in the country.

The very latest equipment, including glass lined pipes and vats, plus a closer control than has heretofore been thought possible, combine to give you uniform purity and quality.

Write for samples and prices.

Maneely CHEMICAL COMPANY

Dept. C 1300 Bankers Securities Bldg. Philadelphia 7, Pa.

Plant, Wheatland, Pa.

DANGEROUS FUMES ARE A MENACE TO EMPLOYEES AND MACHINERY

DEBOTHEZAT
BIFURCATOR FANS

- INSTALL RIGHT IN DUCT
- OPERATE IN ANY POSITION

Destructive gases can cause irreparable damage to manpower and machines—your two most valuable production tools.

Whether your fume dispersal problem calls for hood or lateral ventilation, DEBOTHEZAT BIFURCATOR FANS are the answer. When installed, BIFURCATORS become a part of the duct itself requiring no special supporting platforms or elbows.

Fumes are bifurcated (by-passed) around motor, which is open to atmosphere—yet completely isolated from the exhaust stream.

Non-overloading power characteristic protects against motor failure. BIFURCATORS may be installed vertically, horizontally, or on any angle.

AVAILABLE IN CORROSION-RESISTANT CONSTRUCTION

Special heat and/or corrosion-resistant BIFURCATORS are available to meet the demands of specific chemical engineering applications.

FREE Send for new BIFURCATOR CATALOG

DeBothezat Fans Division
American Machine and Metals, Inc.
Dept. C1, East Moline, Illinois

Please send new catalog No. DB-4-48 on BIFURCATORS without obligation on our part.

Firm Name

Address

City Zone State

MANUFACTURERS' LATEST PUBLICATIONS

Chemical Engineering's Reader's Service, in cooperation with manufacturers, makes it possible for you to secure catalogs, bulletins, and other publications herein listed without obligation (unless a price is specifically mentioned). For your convenience, publications may be obtained by using Reader Service Coupons on pp. 155-156.

(Continued from page 156)

illustrates the gas filled recorders and recording pressure gages produced by this company. Details of bulb construction and pen arm movement are illustrated.

113. Air Valves. Paul Valve Corp., New York, N. Y.—4-page bulletin describes the new type, straight through valve produced by this company. This valve is springless, and is suitable for any air line up to 100 psi. pressure.

113. Pumps. Byron Jackson Co., Los Angeles, Calif.—12-page booklet No. 48-2040 describes the general-purpose pumps produced by this company which are suitable for medium and low head services. Complete dimensions and specifications for the pumps are given together with selection tables and general engineering information.

114. Motors. General Electric Co., Schenectady, N. Y.—Three new 4-page bulletins describe the various types of high-speed, synchronous motors and generators produced by this company. Special features of these motors and generators are outlined and one of the bulletins deals particularly with applications for these motors in the lumber, pulp and paper industries.

115. Bottle Labeling. National Adhesives, New York, N. Y.—This new booklet titled "Successful Bottle Labeling" gives information on the selection of the proper type of adhesives for applying all types of labels to glass surfaces. It also contains information describing common labeling difficulties together with descriptions of their causes and methods for correction. Other portions of the book give information on such things as container design and handling of adhesives.

116. Machinery. Hamilton-Thomas Corp., Hamilton, Ohio—This 16-page bulletin illustrates the various types of equipment put out by different divisions of this company. Equipment which will be of interest to chemical engineers includes pipeline compressors, rotary valves, various types of pumps, and regulating valves.

117. Protective Coatings. Tar Products Div., Koppers Co., Pittsburgh, Pa.—12-page folder gives information on the various types of protective coatings made by this company together with detailed information on the best methods of application for cold-applied protective coatings. Included is material on surface preparation, coating thickness, and methods of application. Specific applications are described.

118. Oakes Mixer. American Machine & Foundry Co., New York, N. Y.—2-page data sheet describes the Oakes continuous, automatic mixer for large-scale mixing in the food and chemical fields. Mixing capacities on this unit are said to be as high as 6,000 lb. per hr., and the unit is constructed for easy cleaning. Specifications and service facilities required are given.

119. Single Control Valve. Cochrane Corp., Philadelphia, Pa.—8-page bulletin No. 4460 describes the single control valve produced by this company. The valve offers four normal and two standby positions and is particularly adapted for

T. SHRIVER & COMPANY, Inc.
802 HAMILTON STREET · HARRISON, N. J.

YOUR GUIDE TO BETTER FILTRATION

TELLS HOW TO DETERMINE • SELECT APPLY AND ESTIMATE COST of the Right Filter Press for Your Process

Write for a Copy of This Free Catalog

This new book tells what you should know about Shriver Filter Presses and their advantages in relation to the nature of your products, filtration rates and operating methods, under variable physical and chemical conditions. It provides a quick, easy chart method of determining filtering area and capacity requirements, and cost of new equipment. It is interesting, informative, helpful; free on request.

All the Requirements FOR LIQUID PROCESSING

TYPE "H." A mixing or storage tank recommended for low headroom installations.

TYPE "J." A modern design open-top San-I-Tank.

TYPE "K." Closed top tank for mixing or storage.

TYPE "L." Large capacity and low sides for shoulder height operation.

TYPE HALF ROUND. An ideal storage vat for processing liquids or foods.

STOCK POTS. Sturdy, stainless steel utility pots.

are in STAINLESS STEEL SAN-I-TANKS

- A COMPLETE LINE
- STREAMLINED DESIGN
- PRACTICAL CONSTRUCTION
- EASY OPERATING
- SELF DRAINING
- LOW COST

Send today for your free copy of Bulletin SS-48. Contains full information, specifications and data on Single Shell SAN-I-TANKS.

Thousands of industries throughout the world are using SAN-I-TANKS to meet their liquid processing requirements. Whether the operation is mixing, blending or storage . . . in tank capacities from five to 5,000 gallons . . . there's a SAN-I-TANK to handle the job.

Experience gained through many years in the tank fabricating industry has resulted in a complete line of modern SAN-I-TANKS. Durable, stainless steel construction assures long-term service and top operating efficiency that meets every sanitary requirements.

SAN-I-TANKS also feature a full line of accessories including motor-driven agitators, sanitary flush valves, faucets and covers.

For liquid processing equipment that meets your exact requirements check with SAN-I-TANK first!

STAINLESS STEEL SAN-I-TANKS

SERVING THESE INDUSTRIES: BEVERAGE • MILK • FOOD • DRUGS • CHEMICALS • COSMETICS

METAL GLASS PRODUCTS COMPANY

GENERAL OFFICES BELDING 2, MICHIGAN

FLAME PROTECTION

FOR ALL YOUR

Inflammable

GAS LINES!

"VAREC"
approved
HORIZONTAL
FLAME ARRESTERS
2" to 12" sizes

"VAREC"
approved
VERTICAL
FLAME ARRESTERS
2" to 12" sizes

In handling inflammable gases, the danger of fire and explosion is ever present. Resulting flames will travel rapidly along lines of least resistance. When your gas lines are protected with "VAREC" Approved Flame Arresters, you can be sure of stopping flame propagation to any storage or gas-making unit.

"VAREC" Flame Arresters are scientifically designed with streamlined housings and expanding passageways to permit maximum gas flow with minimum pressure drop. The free area through the flame arresting grids is 4 to 5 times the free area of corresponding sized pipe. To counteract corrosion, these flame arresters may be obtained in suitable materials for various gases.

"VAREC" Approved Flame Arresters are listed by the Underwriters' Laboratories and approved by Factory Mutual Laboratories as well as other safety authorities. Demand that these accepted devices be installed on all your inflammable gas lines.

"Varec"

THE VAPOR RECOVERY SYSTEMS COMPANY
COMPTON, CALIFORNIA, USA

NEW YORK · CLEVELAND · CHICAGO · TULSA · HOUSTON

CABLE: VAREC COMPTON (All Codes)

use on ion exchange units and pressure filters. Examples of the use of this valve in these particular applications are given.

120. Deep Well Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.—8-page bulletin No. B-200 illustrates and describes the deep well pumps produced by this company. These turbine pumps are built with water capacities up to 5,000 gal. per hr. and can handle depths as great as 200 ft. A pump selection chart is included.

121. Drum Closure. McDowell Manufacturing Co., Pittsburgh, Pa.—4-page bulletin illustrates a new type drum closure which the company states is completely leak-proof and tamper-proof. The closure includes a seal which must be broken before the drum may be opened. Sectional views of this closure are shown in the bulletin.

122. Water Softener. Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—4-page bulletin No. 28B7107 describes the softening of water with a sodium zeolite softener. A diagrammatic drawing of a normal installation is included together with information on operation of this type softener.

123. Flow Measurement. Bethlehem Foundry & Machine Co., Bethlehem, Pa.—6-page folder describes the new flow tube produced by this company which will be competitive with more conventional devices such as the orifice, the flow nozzle and the Venturi tube. The folder describes the theory of operation of the unit, and gives engineering information on measurements with this flow tube. Advantages claimed for this tube include greater simplicity, cheaper construction and installation, higher accuracy, more economy, and greater range.

124. Vibration Control. Korfund Co., Long Island City, N. Y.—4-page bulletin No. G-101 describes the various types of vibration control equipment produced by this company, including spring mountings, rubber mountings and cork material. A selector chart is given covering various types of machinery encountered in the process industry.

125. Flexible Metal Tubing. Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.—Two bulletins, of 6 and 12 pages, describe the various types of flexible metal tubing produced by this company and list applications. Specifications are shown for both galvanized steel and bronze tubing, together with necessary accessories.

126. Pumps. Roy E. Roth Co., Rock Island, Ill.—Three new bulletins on pumps have been put out by this company. An 18-page bulletin No. 101 describes heavy-duty flexible coupled pumps and includes specifications, selection tables and prices. 4-page bulletin No. 102 gives similar data for the company's Monobilt pump. Bulletin No. 200 gives similar information on the packaged boiler condensate return unit produced by this company.

127. Alloy Castings. Michiana Products Corp., Michigan City, Ind.—16-page booklet No. 111 gives the properties of various high temperature and stainless alloys used by this company. Products cast from these alloys are shown. Uses by this company of centrifugal castings are also illustrated.

128. Equipment. Glasco Equipment Corp., Paterson, N. J.—4-page folder shows the various types of equipment fabricated by this company. Included are stainless tanks, storage bins, and dryers.

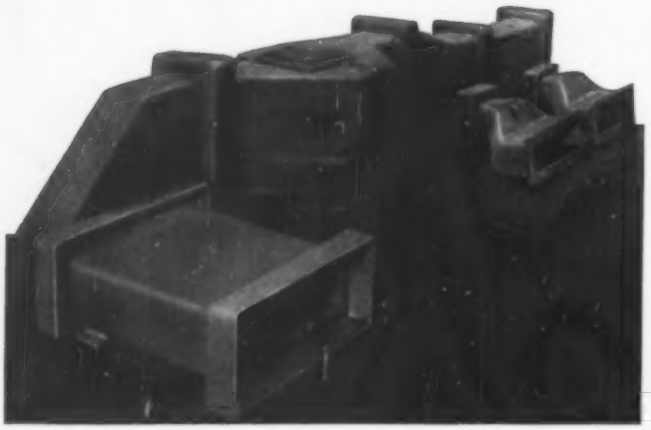
129. Steel Buildings. Armco Drainage & Metal Products Co., Middletown, Ohio—6-page folder shows the various types of standardized steel buildings produced by this company. The buildings are produced in a wide variety of sizes and shapes and low initial cost and maintenance are claimed for them.

130. Concrete. L. Sonneborn Sons, Inc., New York, N. Y.—6-page folder describes the advantages of the admixture products produced by this company to improve concrete, mortar, stucco, and cement plaster. Methods of use are also given.

131. Motor Brushes. National Carbon Co., New York, N. Y.—Catalog Section B-2106 outlines a method of standardiz-

SIDE ENTRANCE MIXERS
½ to 25 H. P. Sizes; Repacked from outside.
MIXERS AND KETTLES
Complete with Tank and Drive Unit in various types and sizes, with any style stirrers, propellers or turbine.
RIBBON MIXERS
Belt or Motor Driven.
PORTABLE MIXERS
International
Chemical Processing
EQUIPMENT
PERMANENT MIXERS
BALL AND PEBBLE MILLS
DRY BLENDERS,
NEW CATALOGS
On Mixers, Agitators, Blenders, Ribbon Mixers, etc., Now ready.
CATALOG No. 85 on BALL MILLS—Either catalog or both sent on request.
INTERNATIONAL ENGINEERING, INC.
NEW YORK 15 Park Row
DAYTON 1, OHIO
CHICAGO 407 S. Dearborn St.
LOS ANGELES · 150 W. NORTON AVE. · FERNHOLZ MACHINERY CO.

KNIGHT-WARE
CHEMICAL EQUIPMENT



KNIGHT-WARE in many forms *Solves Corrosion Problems*

When completed the KNIGHT-WARE Fume Collector assembly, shown above, consisted of laboratory table fittings, saddle-packed scrubber, fan adapter and connecting ducts. Made of KNIGHT-WARE throughout, it was installed to remove corrosive fumes from the laboratory of a large industrial plant.

KNIGHT-WARE, an extremely dense, hard ceramic, is corrosion proof throughout its entire body and is resistant to acids, alkalies and other corrosive agents. It can be formed to almost any shape and in most types of equipment can be made in one seamless, jointless piece. KNIGHT-WARE is available in a wide range of processing equipment and lab. equipment. These include such diverse items as:

Fume Ducts	Kettles	Troughs	Jars
Towers	Valves	Acid Lines	Filters
Tanks	Sinks	Tower Packing	Sumps

Consider KNIGHT-WARE in your equipment requirements for its complete corrosion resistance, flexibility in design and relatively low cost. Write to Knight outlining your needs. Your problem will receive prompt attention.

Maurice A. Knight 101 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

FOR MORE INFORMATION
See Reader Service Coupon on pages 155-156

ing the motor and generator brushes which must be used by a company having a great number of custom-built, individually ordered brushes with random specifications. A simplified numbering system is used in making standardization. It is claimed that use of the system will reduce the number of stock items which must be carried.

132. Fans. Ilg Electric Ventilating Co., Chicago, Ill.—Catalog No. 148 illustrates the various types of self-cooled, propeller fans produced by this company. These fans have applications in both industrial and ventilating fields. Some of them combine filters for dust demoval.

133. Dust Collectors. Aget-Detroit Co., Ann Arbor, Mich.—2-page bulletin A-550 describes the unit dust collecting equipment produced by this company. It is primarily designed for cases where the dust to be collected has large bulk density. The unit contains an integral cyclone separator and dust filter. Specifications and prices are given.

134. Soya Protein. Spencer Kellogg & Sons, Decatur, Ill.—A new technical bulletin describes the use of this company's commercial soya protein "Kelkote" in preparing water emulsion paint. Comparison is given with the use of other materials.

135. Magnet Pulleys. Dings Magnetic Separator Co., Milwaukee, Wis.—Two new 8-page bulletins, Catalogs C-1001A and C-1007A, describe the various types of magnetic pulleys produced by this company. One catalog describes equipment using electromagnets, while the other describes equipment using permanent magnets. Specifications and capacities for these pulleys are included.

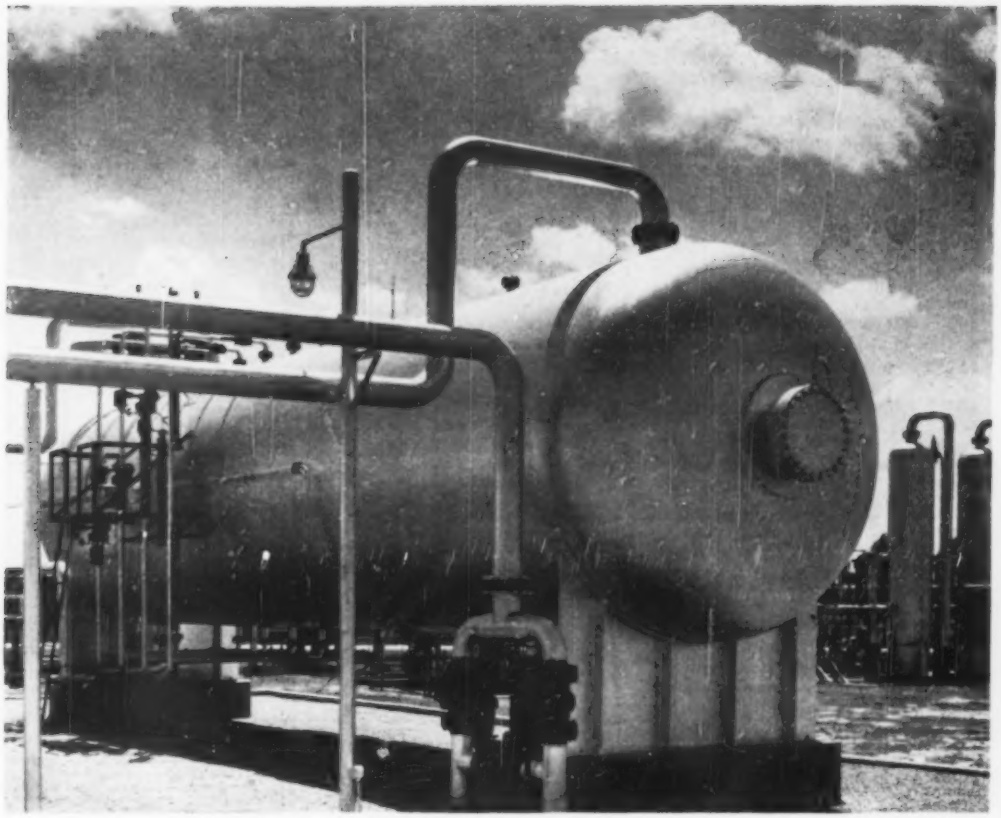
136. Data Chart. W. C. Hardesty Co., Los Angeles, Calif.—Three new data sheets have been put out by this company giving information useful to those using fatty acids as well as to the process industry in general. The first shows the fatty acid components of the most commonly used fats and oils. The second is a color standard comparator which compares different systems of color standards. The third is a temperature conversion table giving conversions to both Fahrenheit and Centigrade scales.

137. Heat Transfer Equipment. Western Supply Co., Tulsa, Okla.—24-page bulletin describes the heat exchangers produced by this company. Specifications are given together with considerable engineering data for preliminary design. Rough prices for approximate estimates are given.

138. Brazing. Handy & Harman, New York, N. Y.—4-page bulletin No. 17 gives detailed instructions on the best methods of brazing using this company's low temperature silver alloys.

139. Equipment. Schmieg Industries, Inc., Detroit, Mich.—Two new catalogs, 12-page catalog No. 480 and 32-page catalog No. 481, describe the various types of equipment produced by this company. Catalog 480 describes the booth produced for carrying away overspray when spray painting. Actual installation and blueprints are included. Catalog 481 describes the various other types of equipment produced including dust and fume control units, mechanical washers, industrial ovens, and sheet metal equipment.

140. Instrumentation. Brown Instrument Co., Philadelphia, Pa.—Three new catalogs and a data sheet have been made available by this company. 44-page catalog 15-12 describes the pH and conductivity recorders and controllers produced by this company. The catalog includes a discussion of the fundamentals of such measurements, specific applications in a series of process operations, and a discussion of the various accessories which



High pressure "salesman" at work

The cylindrical flash drum shown above is designed to operate at 500 lbs. per sq. in. pressure. Like many other pressure vessels and tank installations which we have made, its record of satisfactory operation is a recommendation for the use of other CB&I products—it's one of our best "salesmen".

The above view was taken at a natural gasoline absorption plant in Texas. The condensate recovery system, of which the flash drum is a part, is used to recover liquid hydrocarbons from natural gas. In the condensate fractionating cycle of this recovery system, the pressure is reduced from 1,000 to 100 lbs in three stages. The flash drum operates at the 500 lb. level.

We design, fabricate and erect many kinds of steel plate structures, similar to the cylindrical pressure vessel shown above, for the chemical processing industry. We build the well-known Hortonsphere, a spherical pressure container for the storage of such products as hydrogen, anhydrous ammonia, and carbon monoxide, under pressures from 25 to 100 lbs. per sq. in.

Our plants have facilities from a stress-relieving and x-raying vessels to meet code requirements. Special non-corrosive metals are supplied when specified. Each job, from design to final erection, is handled by qualified engineers and workmen. When you need steel plate work, write our nearest office for quotations.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2120 Healey Bldg.	Detroit 26	1503 Lafayette Bldg.	Philadelphia 3	1625—1700 Walnut St. Bldg.
Birmingham 1	1510 North Fiftieth St.	Havana	402 Abreu Bldg.	Salt Lake City 1	1505 First Security Bank Bldg.
Boston 10	1005-201 Devonshire St.	Houston 2	2103 National Standard Bldg.	San Francisco 11	1222—22 Battery St. Bldg.
Chicago 4	2124 McCormick Bldg.	Los Angeles 14	1405 Wm. Fox Bldg.	Seattle 1	1305 Stuart Bldg.
*Cleveland 15	2220 Guildhall Bldg.	New York 6	3318—165 Broadway Bldg.	Tulsa 3	1623 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Use the NEW Dings
ALNICO MAGNET
PERMA-PULLEY*

• Here's the modern, low cost, positive way to remove tramp iron from material carried on conveyor belts. No wiring . . . no electrical accessories . . . no operating cost . . . no maintenance . . . good for life . . . tremendous power . . . completely automatic — The new Dings PERMA-PULLEY is a revolutionary contribution to magnetic separation. You can install it and forget it!

Backed by 50 years of magnetic separator manufacturing experience, this new pulley offers these plus features that assure you of maximum tramp iron removal:

- **Extra high strength grade of Alnico**
- **Closely spaced poles**
- **Magnetic strength equal across entire belt width**
- **Crowned face to prevent belt weave**
- **Extremely high surface strength**

Dings PERMA-PULLEYS are available in 53 sizes with shaft diameters to suit your requirements. Fully described in NEW BULLETIN No. 260-A which includes comparative Magnetic Strength Curve proving that you get greater protection with DINGS! Send for a copy.

DINGS MAGNETIC SEPARATOR CO.
4730 W. McGeogh Avenue, Milwaukee 14, Wis

***MOST POWERFUL NON-ELECTRIC PULLEY ON THE MARKET!**

Dings offers you the most powerful magnetic pulleys for the job:

1. For ordinary burden depths—The Dings *Perma-Pulley* with its extremely high surface strength.

2. For very heavy burdens—The Dings "High-Intensity" Electromagnetic Pulley with its great depth of magnetic penetration.

MAGNETIC PERMANENCE GUARANTEED for life!

Dings
"HIGH INTENSITY"

are available. 32-page catalog No. 15-13 describes the various potentiometers which this company manufactures. The third catalog, 32-page catalog No. 7000, illustrates this company's pressure and vacuum gages. Methods of applications of these recording and controlling instruments are shown. The 2-page data sheet No. 10.4-1 illustrates the method of application of the Gagetron liquid level control, which utilizes gamma ray to determine the liquid level.

141. Terpene Resin. Pennsylvania Industrial Chemical Corp., Clariton, Pa.—8-page bulletin describes the properties and advantages of Piccolyte, a hydrocarbon thermal plastic terpene resin produced by this company. Applications and physical and chemical data are given.

142. Flakers. Goslin-Birmingham Manufacturing Co., Birmingham, Ala.—4-page bulletin No. 801 describes the open and totally-enclosed type flakers produced by this company. Specifications are given for the standard size units which vary in drum area from 12½ to 78½ sq. ft.

143. Coal Crushers. Pennsylvania Crusher Co., Philadelphia, Pa.—16-page bulletin No. 3007 illustrates the various type of coal crushers produced by this company. Dimensions, capacities and other specifications are given. Illustrations are given on the use of this equipment in byproduct coke ovens and in power houses.

144. Welding Equipment. Victor Equipment Co., San Francisco, Calif.—40-page bulletin No. 20-B describes and gives specifications for the various types of gas-welding and flame-cutting equipment produced by this company. Welding and cutting punches, valves, and cylinder manifolds are included.

145. Oil-Gas Burner. Hauck Manufacturing Co., Brooklyn, N. Y.—8-page catalog No. 408 describes the combination oil and gas burners produced by this company. Complete specifications, capacities and dimensions are shown. The burner can automatically be switched from one fuel to another without shutting down the furnace.

146. Colloid Mills. Premier Mill Corp., Geneva, N. Y.—4-page bulletin describes the various liquid and paste-type mills which this company produces. A selection chart is included together with power requirements for these mills.

147. Fatty Amines. Armour & Co., Chicago, Ill.—This 26-page booklet, entitled "The Chemistry of Fatty Amines," gives detailed information on the various organic reactions which fatty amines may undergo. Physical properties are also given.

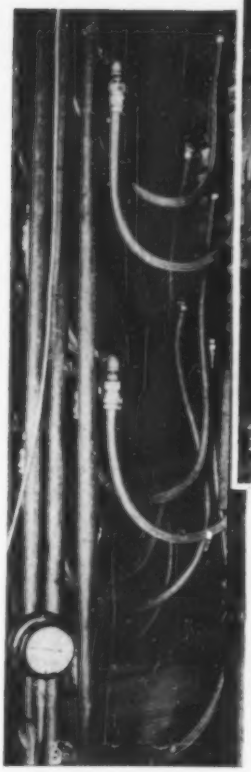
148. Steel Piling. L. B. Foster Co., Pittsburgh, Pa.—This 6-page brochure describes the various types of interlocking corrugated steel piling produced by this company. Applications and advantages for this type piling are discussed.

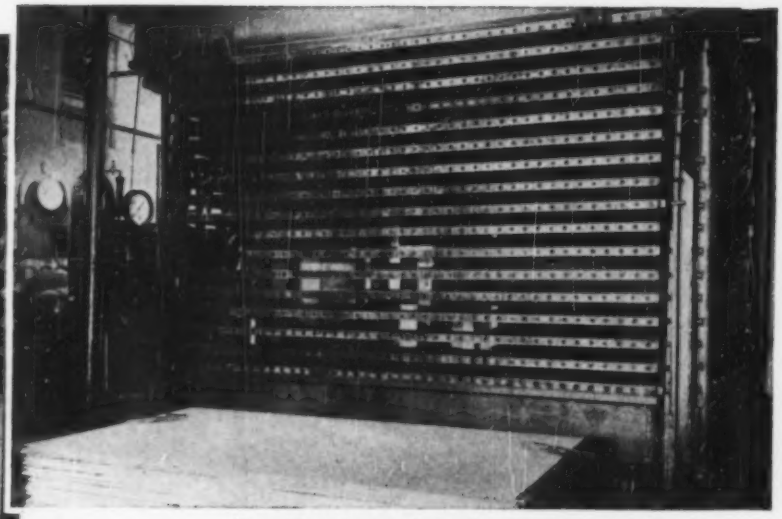
149. Instruments. Clapp Instrument Co., Webster, Mass.—Two 4-page bulletins have been published by this company, the first discussing pressure gages and the second a liquid level control switch. The pressure gages are of spring type and can handle pressures up to 10,000 lb. The liquid level control switch which, in conjunction with its float unit, is available for operation at pressures up to 20,000 lb.

150. Fuel Oil Heaters. Peabody Engineering Corp., New York, N. Y.—4-page bulletin No. 150 describes the fuel oil heaters, or pump and heater sets, produced by this company. These package units contain two heaters and two pumps to eliminate boiler down time due to cleaning of the heater.

151. Alarm Systems. Autocall Co., Shelby, Ohio—4-page folder describes the audible-visual annunciators produced by this company for industrial and public utility signalling purposes. Dimensions and wiring diagrams are included.

152. Vacuum Equipment. F. J. Stokes Machine Co., Philadelphia, Pa.—20-page catalog No. 49-C describes the high vacuum equipment produced by this company. Included are freeze-drying equipment, vacuum shelf dryers, vacuum impregnators, extraction and solvent recovery equipment, vacuum stills and condensers, and high vacuum pumps. Specifications and dimensions are given.





Above: 16-opening press for bonding plywood—at a large West Coast plywood plant. Note panels in foreground.
At Left: Close-up showing some of the American Seamless S-1 Flexible Bronze Tubing Steam Connectors to the 17 platens of the press.

Where Connectors must *Flex like rope* while carrying 75-lb. steam

THESE FLEXIBLE CONNECTORS stand a double test. They carry steam at 75 pounds pressure to the platens of a big, 16-opening plywood bonding press at a large West Coast plant. Because the platens move, flexible connections are a must. But safety and efficiency are important factors too, and the connections must be absolutely steam-tight as well as flexible.

For this job, American Seamless Flexible Bronze Tubing, ½" I.D., covered with a bronze wire braid for strength under pressure, made just the right connections. They were designed by American and supplied with heat-proof reattachable couplings—typical of our engineering advice on couplings which assures the best assembly for every hose or tubing duty.

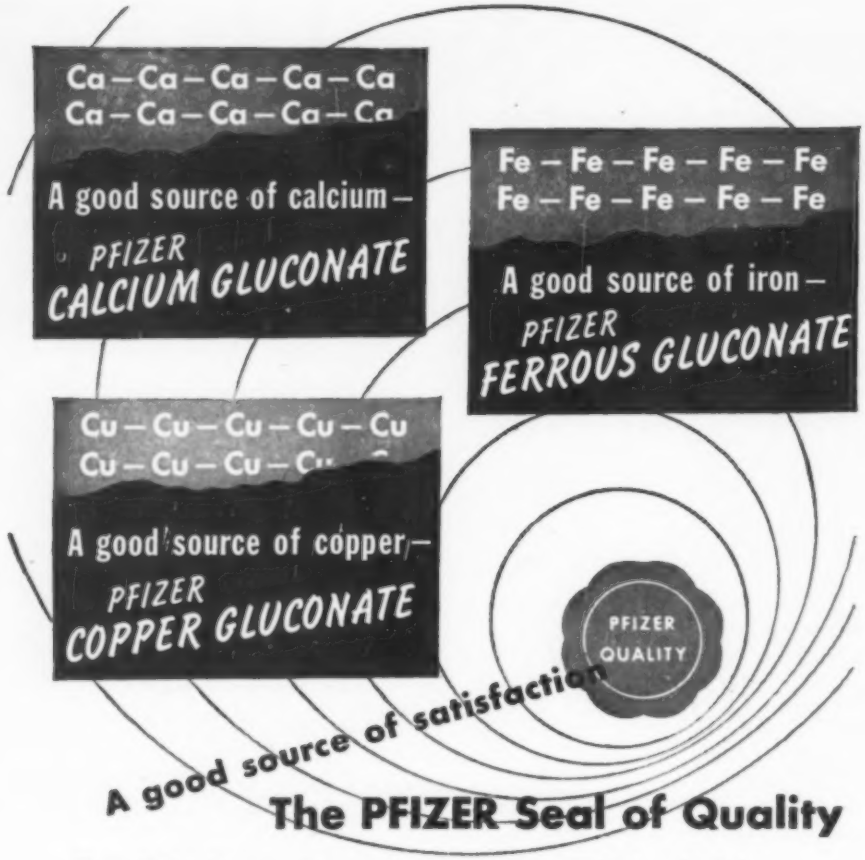
FREE PROBLEM-SOLVING DEPARTMENT

You might have a connector problem where there is trouble caused by vibration, misalignment, the connecting of moving parts or piping in cramped spaces. Whether it involves conveying steam, oil, water, other liquids, semi-solids or gases, we can help you. We'll consider your problem, make recommendations and—if you like—design your connector specially from fitting to fitting, at no extra charge, using Seamless Flexible Metal Tubing or Flexible Metal Hose (made from spirally wound strip in a wide variety of metals). Comprehensive literature on request.

ANACONDA

American
METAL HOSE

THE AMERICAN BRASS COMPANY
American Metal Hose Branch
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
Distributed in Canada by:
THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED


Ca – Ca – Ca – Ca – Ca
Ca – Ca – Ca – Ca – Ca
A good source of calcium –
PFIZER
CALCIUM GLUCONATE
Fe – Fe – Fe – Fe – Fe
Fe – Fe – Fe – Fe – Fe
A good source of iron –
PFIZER
FERROUS GLUCONATE
Cu – Cu – Cu – Cu – Cu
Cu – Cu – Cu –
A good source of copper –
PFIZER
COPPER GLUCONATE
PFIZER
QUALITY
A good source of satisfaction

The PFIZER Seal of Quality

Users of Pfizer Gluconates know the importance of *known quality* in a chemical. They realize that, in its operations, Chas. Pfizer & Co., Inc. combines the soundness of a long-established firm with the progressiveness of a constantly pioneering spirit.

From the company's biological research laboratories, for example, came the production of gluconic acid by a fermentative oxidation of glucose. And each of the salts of this acid reflect, in turn, benefits from the proper selection and control of manufacturing methods and procedures.

Other Pfizer Gluconates which may be of interest include Sodium Gluconate, Magnesium Gluconate, Manganese Gluconate, Acid Gluconic Technical, and Glucono-delta-Lactone. For further details on the present usefulness and potentials of Pfizer Gluconates, please address Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y.; 211 E. North Water St., Chicago 11, Ill.; 605 Third Street, San Francisco 7, California.

PFIZER

Manufacturing Chemists Since 1849

4728

CHEMICAL ECONOMICS

Richard F. Warren, ASSISTANT EDITOR

Process Industries Finish Their Best Year as Supply and Demand Swing Into Balance

CHEMICAL process industries rolled into 1949 with big plans for the future in spite of the fact that business was becoming competitive in many lines. The general feeling of the chemical industry is that we are in an expanding economy and while some backing and filling is bound to occur when large segments of the process industries expand rapidly after being restricted for several years, business will continue to stay at high levels. Evidence of this feeling is given by a McGraw-Hill survey that shows chemical and allied industries will spend well over $1 billion in capital outlay this year.

Rubber

Rubber manufacturers set new production records last year and they are sure that broad markets for rubber will continue. The producers say that postwar markets are far greater than estimates made at the end of the war indicated. Underlying demand has exceeded expectations. Industry's consumption of rubber exceeded the million ton mark for the third consecutive year. Last year, 1,075,000 long tons was used. The long term growth trend is especially rapid in the latex foam field. Substantial progress was made in synthetic rubber. This side of the rubber industry received a big lift with the introduction of the new low temperature synthetic. Production of this type has reached an annual rate of 21,000 tons. This year the figure will be increased to 183,000 long tons, as RFC converts some existing synthetic capacity to the new "cold" rubber. The new rubber may have a considerable impact on the consumption pattern of various types of rubber. Last year the consumption ratio of natural to synthetic was three to two. A very large part of synthetic was used in places where it was preferred to natural. This indicates the growing place of synthetic in our economy.

The paint industry is expecting new sales records this year. Sales volume was up more than 3 percent last year and sales should show a similar growth this year. This means that industry sales will be above $1 billion for four consecutive years. This compares very favorably with the best prewar year when sales reached $400 million. Use of contrasting color schemes in industrial plants for employee comfort has caused an additional spurt in business. High farm income indicates that paint sales in the farm market will be high again this year.

Chemical Engineering Index

Industrial Consumption of Chemicals

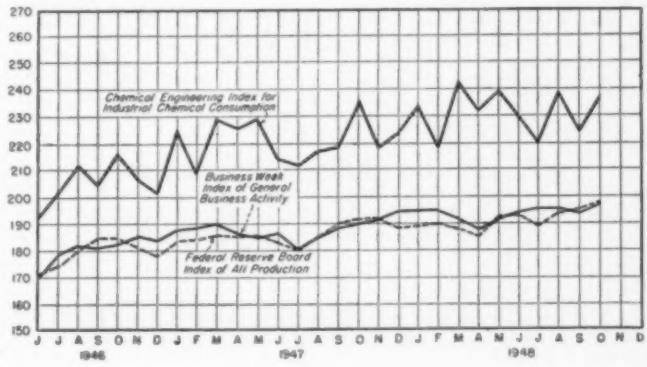
1935 = 100

	September (Revised)	October
Fertilizers	48.10	55.10
Pulp and paper	23.40	25.20
Petroleum refining	19.05	22.30
Glass	20.01	21.20
Paint and varnish	25.15	23.00
Iron and steel	13.71	14.65
Rayon	26.50	26.95
Textiles	10.75	10.38
Coal products	10.43	10.60
Leather	4.30	4.53
Explosives	5.85	5.66
Rubber	5.23	5.20
Plastics	9.34	9.36
INDEX	224.89	237.13

Last month the state government in Texas curtailed January crude petroleum production about 10 percent. The action was taken to avoid surplus output—some feel that the mild winter weather in 1948 cut requirements sharply and the action was taken to prevent flooding the markets. This industry set new records in output and chemical consumption last year in spite of the refinery strikes which cut into West Coast output.

Resins

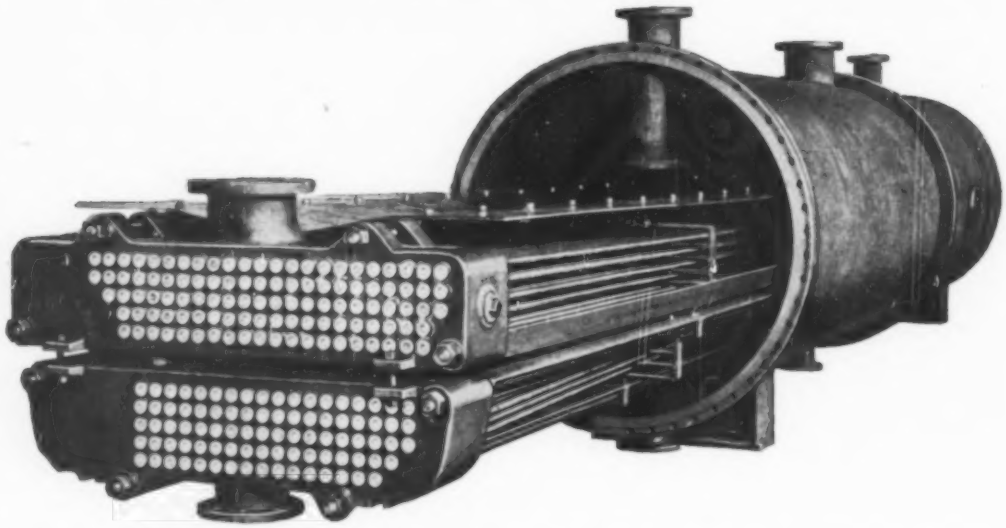
Plenty of natural and synthetic resins will be available for consumers this year as backlogs have been cleared up. Producers expect demands in the coming year to represent a more correct picture of industrial demand. Purchasing schedules now reflect actual requirements instead of inflated demands by consumers which might be used to get bigger shipments under allocation systems set up by producers. While the government's buying program may divert some raw materials, a buyer's market has returned to this industry and the competitive market will keep the consumers well supplied at reasonable prices. Raw materials for resin-makers (such as glycerine, phthalic anhydride, maleic anhydride, and oils) are going to be available in sufficient quantities to allow producers to operate at a level which will supply the steady and substantial demand.



Have You Investigated the

G-R BENTUBE

Scale-Shedding Evaporator?



When you use an evaporator to distill raw water for boiler feed make-up, for process steam, or to obtain pure water for any other purpose, what happens to the scale-forming impurities that are precipitated on the evaporator tubes?

With a G-R Bentube Evaporator, you don't have to worry about their removal. Scale cannot accumulate on G-R Bentube elements in sufficient amount to require hand scaling. This is because of the patented design of these elements, which are set with a slight initial curvature into cast headers. The changes in temperature during operation cause changes in this curvature which continuously crack up and flake off scale accumulations and keep the tubes sufficiently free from scale to maintain rated capacity.

Even where the scale formation is exceptionally rapid or tenacious, hand scaling is unnecessary with a properly operated G-R Bentube Evaporator. In such cases, scale may be cracked off by "temperature shock," obtained by first chilling the evaporator tube surface with cold water and then quickly admitting steam to the evaporator elements.

These units are built in a range of types and sizes for all requirements of industrial plants, process plants and central power generating stations. Each type includes additional distinctive features that assure 100% effective evaporating surface, pure dry vapor, minimum pressure drop of steam through the evaporator, free dropping of scale to the bottom of the shell, and convenient access to the shell interior.

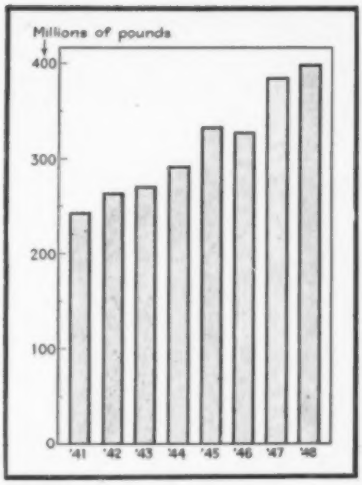
Write for Bulletin 366 describing G-R Bentube Evaporators in detail.

THE GRISCOM-RUSSELL CO., 285 MADISON AVENUE, NEW YORK 17, N. Y.

GR-219

GRISCOM-RUSSELL

PIONEERS IN HEAT TRANSFER APPARATUS



PRODUCTION. Hitched to rayon's star

J. T. Baker Chemical Co.
Penn Yan, N. Y.

Dow Chemical Co.
Midland, Mich.

Old Hickory Chemical Co.
Old Hickory, Tenn.
Bellwood, Va.

Stauffer Chemical Co.
Chauncey, N. Y.
Niagara Falls, N. Y.
Chester, Pa.
Monongahela, Pa.
Roanoke, Va.
Bentonville, Va.
Perry, Ohio

Wheeler, Reynolds & Stauffer Co.
Richmond, Calif.

Westvaco Chemical Div., Food Machinery Corp.
South Charleston, W. Va.

PRODUCERS. Stauffer's biggest.

Carbon Bisulphide

Some chemicals find special places in the national economy and grow with an industry. Carbon bisulphide is one of this type. There are two major uses for this chemical. Rayon is the top consumer, carbon tetrachloride production is the second largest user. All the other uses are minor when compared with these but there are several worth mentioning. Among them are insect control, weed eradication, flotation agents, and the further solvent uses for extracting resins and waxes, fats and oils from oilseeds, and essential oil production.

Other Uses

In addition to these, it finds extensive use in the rubber industry in fabricating waterproof and seamless products, cold vulcanization, rubber reclaiming, and production of rubber cements. It is incorporated in varnishes and lacquers and in paint and varnish removers. In the textile industry it is used in spotting preparations. Carbide bisulphide is used to produce several chemicals in addition to carbon tetrachloride. These include thiocarbanilide, thiocyanates, and diphenylguanidine.

Most exported carbon bisulphide is used in Latin America for insect control. In the world picture, several new plants have begun production of carbon bisulphide to augment present supplies in Europe.

Production is generally carried out in electrothermal furnaces. These furnaces have a shaftlike construction with the electrodes just above the hearth. Charcoal is fed in from the top and sulphur is fed into the furnace through the side walls. Some furnaces successfully use fuel heat. Vapors from the furnaces are condensed with cold water, then they are restilled. Carbon bisulphide is produced in USP and technical grades. It is shipped with a red label as a flammable liquid in 7,000-gal. tank cars (ICC Spec. 103, 104, or 104A.), 55-gal. metal drums (ICC Spec. 17C, 5 or 5A.), and smaller containers.

Biggest producer is Stauffer and in the number two spot is Dow. Among the other producers are Westvaco, Old Hickory (a Du Pont-Stauffer controlled firm), J. T. Baker Co. The actual plant locations are shown in the accompanying table. About 0.3 lb. of carbon bisulphide is used to produce 1 lb. of viscose rayon yarn, staple or film. This means that more than 260,000,000 lb. is used in this industry. About 60,000,000 lb. is consumed in the production of carbon tetrachloride, if we assume that about 50 percent of this chemical is made from carbon bisulphide. The remaining 70–80,000,000 lb. is divided between exports and the other uses mentioned above.

There is no real substitute for carbon bisulphide in the viscose picture at the present time and that major use will continue to grow with the booming rayon industry.

Carbon tetrachloride can be made by chlorinating methane, but experts do not believe that current facilities would be sufficient to meet demand. Of the five producers of carbon tetrachloride, all use carbon bisulphide to make their final product. However, Dow also makes a large quantity of carbon tetrachloride by direct chlorination of methane. This is a product of its Freeport, Tex., plant. In recent years production by this method has accounted for a very large percentage of the total output. Insect control and weed eradication are items that have large potential markets.

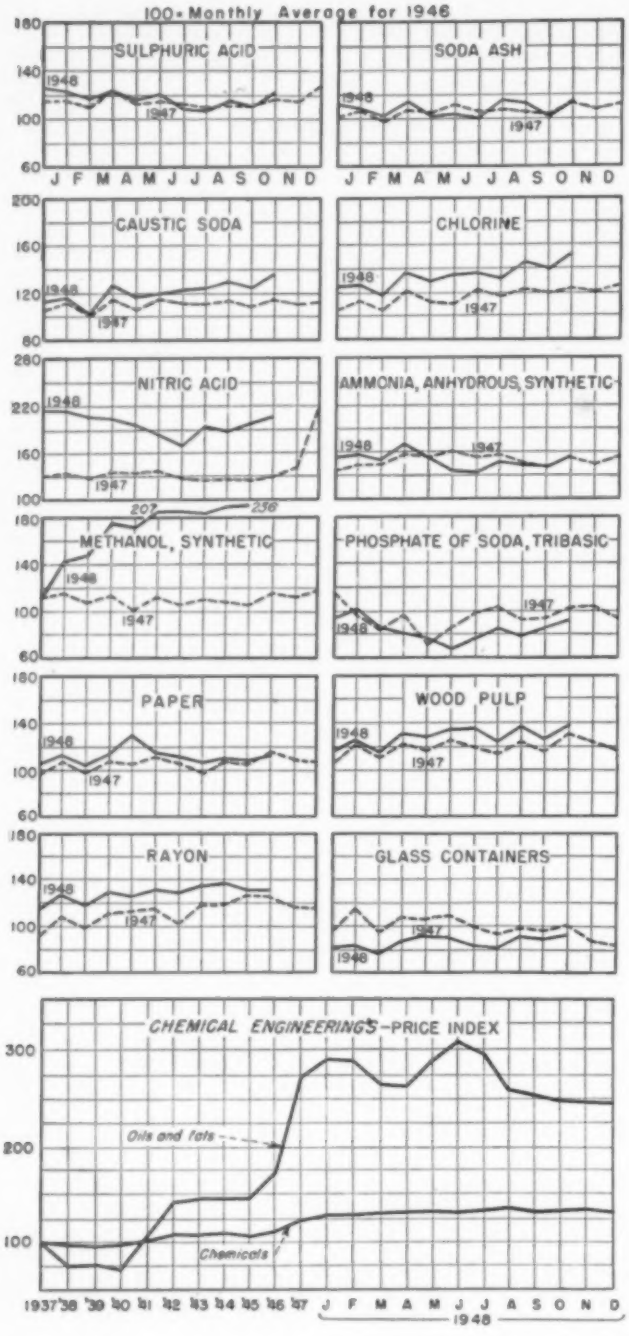
Location of processes using carbon bisulphide should be designed to keep the liquid and vapors in a closed system. Special precautions should be taken in handling, storage or use. It must not be placed near open flame, spark-producing devices, or exposed surfaces with a temperature of more than 200 deg. F. An ordinary light bulb will cause ignition. The vapor when mixed with air or oxygen in certain concentrations is highly flammable and explosive.

It has hazardous properties and must be handled with respect. It is harmful when vapors are inhaled or when the skin is exposed to liquid for prolonged or repeated periods. The Manufacturing Chemists' Association has published a very fine safety data sheet on this chemical which gives detailed information on its properties. It also gives complete information on shipping and handling precautions which are beyond the scope of this report.

Price story of this chemical is not spectacular. From 1937 to 1947 the average value of sales ranged from 3 to 4c. per lb. The present price in carlots is 5½c. per lb.

Outlook for consumption is tied to the two major uses, and it has been pointed out that the number one consumer, regenerated cellulose, is still growing. Consumption in carbon tetrachloride will remain a considerable factor in the over-all consumption pattern, but the direct chlorination will supply a sizable segment of carbon tetrachloride production—even more than 50 percent of the market. Production will therefore probably increase at a moderate rate in the next few years, although the Dow chlorination process has cut into the prewar normal growth curve. Last year's carbon bisulphide production was slightly higher than the 1947 level.

PRODUCTION, CONSUMPTION, AND PRICE TRENDS



PRODUCTION and consumption trends this month could be oversimplified by saying that salesmen of many chemical companies are looking for customers again after a long period of explaining to old customers just why they could not supply needed products. In the last few months of 1948 production of many chemicals, augmented by postwar expansions, began to come into balance with the still healthy demand.

Organic chemicals hit new highs last year as acetic acid, acetone, ethylene glycol, formaldehyde, methanol, and styrene surged above the 1947 levels.

Major inorganic chemicals also rose above the peaks reached in 1947. Soda ash, caustic soda, and sulphuric acid set new records last year. New plants made possible the growth demanded by consuming industries. Rayon industry operated well above the previous peak year as it continued its steady growth. In the paper industry, demand for many grades of paper were being more fully met as additional facilities came on stream.

Last month the Tariff Commission released the final figures on 1946 production and sales of synthetic organic chemicals. More than 550 manufacturers reported on more than 6,000 chemicals. These firms produced 14.2 billion pounds and consumed about a third of this amount in producing plants. The 9.5 billion pounds sold were valued at $1.9 billion.

Price Trends

Ethyl alcohol stole the price spotlight again last month. It continued to fall and on the first of the year SD. 1 was 44c per gal. *Chemical Engineering*'s price indexes for chemicals as well as fats and oils moved downward in December and by the first of January, the chemicals index was down to the lowest point reached since last April. However, at the beginning of the new year most chemical prices seemed to stiffen. Fats and Oils index hit a 14-month low in January. Lower prices seemed probable.

Chemical Engineering

WEIGHTED INDEXES OF PRICES

Base = 100 for 1937

	Chemicals	Oils & Fats
As of January 1	130.47	224.33
Last Month	132.23	246.09
January 1948....	127.11	293.04
January 1947....	121.63	303.82

Name your weave, your mesh, your metal

We can help you cut wire cloth costs

With manufacturing facilities on both the East and West Coasts, and engineering sales service in key cities throughout the nation, we can help you find the answers to your wire cloth problems.

Backed by 90 years' experience, our service to over 100 industries covers the precision fabrication of wire cloth in a dozen different coarse and fine weaves; in all commonly used metals; to withstand chemical action, corrosion, abrasion, moisture, or high temperature.

Whether you use wire cloth for screening, filtering, grading, cleaning, or processing, you'll find Wissco and Calwico Wire Cloth will give long, dependable service.

Super-Tempered PRECISION SCREENS

Even under excessive vibration these screens won't wear loose in service. They're made of tough, super-tempered steel and woven on new modern power looms. Wissco and Calwico Super-Tempered Precision Screens stay tight and accurate throughout a long life. Any length required for vibrating screen or trommel can be furnished with welded, hooked, or reinforced edge to fit any type of vibrator. Write for details.

WISSCO *Wire Cloth* CALWICO

East of the Rockies it's WISSCO
WICKWIRE SPENCER STEEL
STERLING ST., CLINTON, MASS.

CF&I

CALWICO On the Pacific Coast
THE CALIFORNIA WIRE CLOTH CORP.
1080—19TH AVE., OAKLAND, CAL.

FILTER CLOTH

FOR CORROSIVE LIQUIDS

Write us regarding
New Acid and Alkali-proof
FILTER FABRICS

"DURAKLAD"
"SARAN"
WOVEN GLASS CLOTHS
NYLON FABRICS

COTTON AND SPECIAL FABRICS FABRICATED INTO TUBES, BAGS, ETC., FOR ALL PURPOSES

Write for prices. State size, width, quantity, type of filter used.

ALL KINDS OF
• DUST COLLECTOR BAGS •

WM. W. STANLEY CO., Inc.
401 Broadway, New York 13, N. Y.

Send For This Valuable Mailing List Data!

To aid you in planning your direct mail, check any of these mailing lists you may be interested in . . .

- ☐ Business Executives
- ☐ Electrical Appliance Dealers
- ☐ Manufacturing Industries
- ☐ Metal-Working Industries
- ☐ Aviation Industries
- ☐ Bus Industry
- ☐ Chemical Processing Industries
- ☐ Civil Engineering and Construction Industries
- ☐ Coal Mining Industries
- ☐ Electrical Industries
- ☐ Electronic Engineers
- ☐ Food Industries
- ☐ Metal Mining Industries
- ☐ Power Plant Engineers
- ☐ Product Design Engineers
- ☐ Textile Industries
- ☐ Welding Industry

. . . attach this 'ad' to your business letterhead . . . and mail. We'll send you complete information, selections, list counts, and prices. No obligation, of course.

Direct Mail Division

McGRAW-HILL Publishing Company

330 W. 42nd St., New York 18

United States Production of Certain Chemicals

September 1948, September 1947 and Nine-Month Totals for 1948 and 1947

Chemical (Tons unless otherwise noted)	September 1948	September 1947	Total, Nine Months 1948	Total, Nine Months 1947
Ammonia, synthetic, anhydrous[1]	86,062	86,120	803,709	826,787
Ammonium nitrate	79,942	83,941	741,524	779,989
Ammonium sulphate, synthetic (M lb.)	28,516	32,722	253,560	290,135
Calcium arsenate (M lb.)	...	3,107	...	40,016
Calcium carbide, commercial	50,104	47,177	512,901	467,096
Calcium phosphate:				
Monobasic (M lb.)	6,886	5,338	83,625	45,531
Dibasic (M lb.)	6,681	6,572	57,476	56,540
Carbon dioxide:				
Liquid and gas (M lb.)	24,262	25,062	194,342	190,113
Solid (M lb.)	70,065	77,347	353,341	338,295
Chlorine	136,282	124,178	1,271,519	1,157,213
Chrome green (M lb.)	1,153	9,630	990	11,038
Chrome yellow and orange, (C.P.), (M lb.)	3,742	4,067	36,860	35,643
Hydrochloric acid	37,580	33,541	315,414	322,830
Hydrogen (M cu. ft.)	2,298,000	1,902,000	20,283,000	16,478,000
Lead arsenate, acid and basic (M lb.)	...	...	...	...
Molybdate chrome orange, (C.P.), (M lb.)	191	194	4,026	3,016
Nitric acid	95,570	94,564	848,185	739,720
Oxygen (M cu. ft.)	1,279,000	1,063,000	11,722,000	10,015,000
Phosphoric acid (50 percent H_3PO_4	109,160	87,249	889,105	709,139
Soda ash:				
Ammonia-soda process:				
Total wet and dry[2]	357,610	350,004	3,764,665	3,354,058
Finished light[2]	167,340	173,400	1,410,891	1,626,904
Finished dense	132,123	139,067	1,132,208	1,320,158
Natural[3]	24,713	25,303	230,290	208,565
Sodium bicarbonate, refined	13,276	13,210	121,025	107,516
Sodium bichromate and chromate	8,260	7,350	70,636	63,951
Sodium hydroxide:				
Electrolytic process:				
Liquid[4]	133,986	118,501	1,141,750	1,019,065
Solid	29,206	22,861	221,104	160,621
Lime-soda process:				
Liquid[4]	63,177	58,811	579,979	562,560
Solid	22,167	19,480	188,102	163,875
Sodium phosphate:				
Monobasic	1,005	1,180	7,576	10,668
Dibasic	8,282	7,721	80,736	61,213
Tribasic	6,836	7,361	56,416	65,021
Meta	2,452	2,966	25,183	23,008
Tetra	4,945	5,062	47,389	40,176
Sodium nitrate, anhydrous	38,232	36,329	350,322	349,669
Sodium Sulphate				
Anhydrous	13,703	11,886	121,340	104,123
Glauber's salt[4]	14,345	15,524	138,971	134,799
Salt cake[4]	57,561	49,890	478,566	445,649
Sulphuric acid[5, 7]				
Chamber process	210,220	267,220	2,241,227	2,483,734
Contact process, new	801,774	335,486	5,381,013	4,968,353

Data for this tabulation have been taken from "Facts for Industry" series issued by Bureau of the Census. Production figures represent primary production and do not include purchased or transferred materials. Quantities produced by government-owned arsenals, ordnance works, and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. Where no figures are given data are either confidential or not yet available. [1]Includes a small amount of aqua ammonia. [2]Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense. [3]Not including quantities converted to finished dense. [4]Data collected in cooperation with the Bureau of Mines. [5]Figures represent total production of liquid materials, including quantities evaporated to solid caustic and reported as such. [6]Includes oleum grades, excludes spent acid. [7]Data for sulphuric acid manufactured as a byproduct of smelting operations are included.

United States Production of Certain Synthetic Organic Chemicals

September 1948, September 1947 and Nine-Month Totals for 1948 and 1947

	September 1948	September 1947	Total, Nine Months 1948	Total, Nine Months 1947
Acetic acid:				
Synthetic[1]	23,476,646	20,477,947	200,315,813	275,679,107
Recovered	137,673,086	118,745,496	1,076,051,510	1,058,349,914
Natural[2]	1,960,737	2,129,039	19,383,022	19,129,010
Acetic anhydride[1]	69,239,940	48,622,319	561,729,136	451,844,183
Acetone	30,217,320	32,063,333	358,796,149	292,063,845

(Continued on page 322)

CHANGE OF ADDRESS

Director of Circulation
Chemical Engineering
330 West 42nd Street, New York 18, N. Y.

Please change the address of my subscription.

Name .....

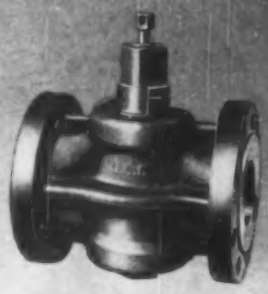
Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

Cylindrical Plug design does not wedge



Protected with a film of lubricant under pressure, the exclusive design of the A.C.F. Cylindrical Plug Valve assures easy turning. It makes possible a port opening of full pipe area, while retaining compact plug valve construction.

a.c.f. CYLINDRICAL FULL PIPE AREA LUBRICATED PLUG VALVES

Representatives in more than 50 principal cities

Reference Catalog No. CM of types and sizes available on request. Write American Car & Foundry Company, Valve Division, 30 Church Street, New York 8, N. Y.

U.S. Production of Synthetic Organic Chemicals (Cont. from page 320)

	September 1948	September 1947	Total, Nine Months 1948	Total, Nine Months 1947
Acetylsalicylic acid	1,043,013	1,082,720	9,493,000	9,238,238
Aniline	8,089,445	8,850,160	73,114,089	78,815,380
5-Ethyl-5-phenylbarbituric acid and salts (phenobarbital)	18,179	41,857	283,486	337,417
Benzene:				
Motor grade:				
Coke-oven operators[2]	686,882	864,097	6,346,345	13,780,188
All other grades:				
Tar distillers[2]	988,690	1,340,785	28,187,905	16,397,678
Coke-oven operators[2]	11,986,815	9,792,311	108,223,141	104,380,648
Butyl alcohol, primary, normal	13,087,430	10,966,888	96,913,411	107,657,138
Carbon bisulphide	30,691,363	29,843,918	296,680,623	280,084,076
Carbon tetrachloride	17,377,385	15,109,445	134,539,841	148,218,471
Chlorobenzene, mono	34,540,868	27,360,404	314,365,077	242,734,072
Creosote oil:				
Tar distillers[2]	9,894,451	10,217,831	81,208,387	91,396,936
Coke-oven operators[2]	2,866,711	3,189,968	26,617,186	29,497,851
Cresols, meta-para	980,299	833,391	8,760,076	4,626,290
Cresols, ortho-meta-para[2]	936,204	847,319	6,911,530	7,005,317
Cresylic acid, refined[2]	1,712,990	1,686,517	21,000,456	19,292,911
Dibutyl phthalate	901,731	1,113,314	11,572,706	15,710,615
Dichlorodiphenyltrichloroethane (DDT)	934,418	3,679,269	11,455,643	39,706,989
Ethyl acetate, (85%)	4,829,833	6,785,284	49,054,787	62,575,400
Ethylene glycol	32,330,807	18,110,892	261,867,219	157,880,091
Ethyl ether	3,353,093	3,684,306	26,130,953	30,740,156
Formaldehyde, 37 percent	49,545,530	41,143,268	455,700,928	389,809,851
Hexachlorocyclohexane	1,381,239	889,592	12,106,016	3,962,902
Methanol, natural[2]	1,289,774	1,289,262	12,171,113	11,981,217
Methanol, synthetic	96,780,114	43,884,214	713,108,430	401,430,445
Naphthalene:				
Tar distillers, less than 79°C.	19,095,669	16,301,827	154,905,411	109,145,038
Tar distillers, 79°C. and over	7,344,340	7,862,695	74,222,338	74,886,872
Coke-oven operators, less than 79°C.	9,962,814	8,099,466	74,043,703	70,822,736
Penicillin and salts	6,110,780	3,267,854	60,009,941	25,884,385
Phenol	25,145,103	23,365,135	211,540,542	194,796,281
Phthalic anhydride	11,011,432	11,709,074	111,883,914	109,186,561
Styrene, government and private plants	33,310,055	23,732,815	279,007,333	235,279,317
Toluene:				
Coke-oven operators	2,366,516	2,363,175	21,122,293	19,673,341
All other[2]	1,518,523	3,294,494	.....	34,722,151
Xylene, crude	4,400,508	2,985,016	44,911,231	31,269,117

All data in pounds except benzene (gal.) creosote oil (gal.), toluene (gal.) xylene (gal.) and penicillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commission except where noted. Absence of data on production indicates either that returns were unavailable or confidential. [1]Excludes the statistics on recovered acid. [2]Acid produced by direct process from wood and from calcium acetate. [3]All acetic anhydride including that from acetic by vapor-phase process. [4]Product of distillers who use purchased coal tar only or from oil-gas or water-gas produced or purchased by tar distillers. [5]Statistics are given in terms of bulk medicinals only. [6]Statistics collected by Bureau of Mines. [7]Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. [8]Reported to U. S. Bureau of the Census. [9]Includes toluene produced from petroleum by any process. [10]Includes refined cresylic acid from petroleum.

before you select a pension plan see EBASCO... for impartial advice

THE PROBLEM:

To evaluate your pension requirements in respect to

- Type of plan—available methods of financing
- Desirability of change in present program
- Comparative costs of alternatives
- Stockholder approval, and Government approval under Internal Revenue Code
- Installation and actuarial service

THE SOLUTION:

Let Ebasco help you make sound decisions

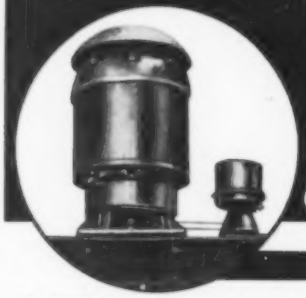
- It is neutral—it is not in the business of selling pension plans
- It is able to install the plan you choose, and follow through with *continuing* advice and actuarial service to maintain it
- It is equipped to prepare, in acceptable form, the annual "Certification of Adequacy" of contributions to pension trusts

EBASCO SERVICES INCORPORATED
Two Rector Street
New York 6, N. Y.

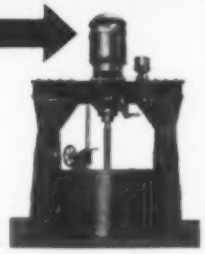
Engineers Constructors Business Consultants

Appraisal · Budget · Business Studies · Consulting Engineering
Design & Construction · Financial · Industrial Relations
Inspection & Expediting · Insurance & Pensions
Purchasing · Rates & Pricing · Research · Sales & Marketing
Systems & Methods · Taxes · Traffic

"CENTROID" SPEED CONTROL AN *EXCLUSIVE* WITH Fletcher CENTRIFUGALS



"CENTROID" provides for automatically regulated unloading speed of only 50 RPM. This means safe, efficient discharging of centrifugal baskets.
"CENTROID" enables operator to give all his attention to handling the unloader.
"CENTROID" gives Fletcher Centrifugals 3 *speeds:* one for loading, one for spinning, and one for unloading. Fletcher Centrifugals increase your production . . . require less attention.



MOTOR DRIVEN SUSPENDED

SEND FOR BULLETIN TODAY!

FLETCHER CENTRIFUGALS
FLETCHER WORKS, 235 GLENWOOD AVE., PHILADELPHIA 40, PA.

Process-Vacuum Engineers

Not Merely Equipment Builders

"Off the Shelf" Ejectors are a very, very small part of C. H. Wheeler business. Complex hook-ups of Two to Five Stage Ejectors, with Pre-Condensers, Inter-Condensers and After-Condensers, for maintaining any absolute pressures down to below 250 microns, are the big part. And they require engineering, after a careful study of each individual process-vacuum requirement. And it's on these problems that C. H. Wheeler experience, as pioneers in this field for well over thirty years, is invaluable in assuring success in new or unusual installations. Flow diagram below is a typical example of "Engineering by C. H. Wheeler." Write us for Catalog No. 1462, or may one of our engineers call?

C. H. WHEELER MANUFACTURING CO.
1808 Sedgley Avenue, Philadelphia 32, Penna.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

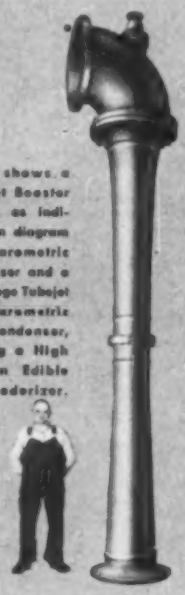
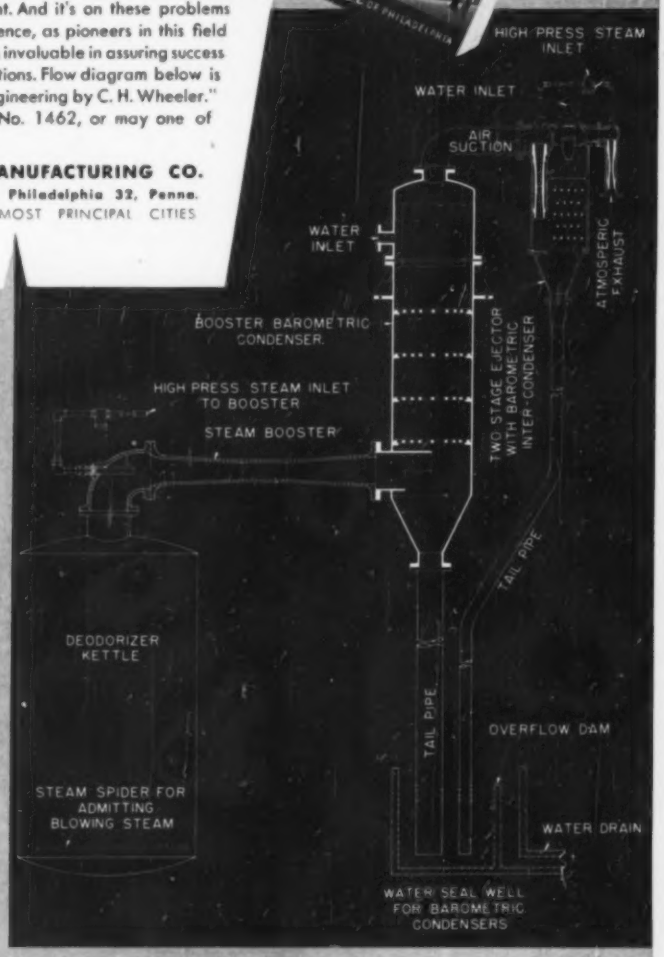


Photo shows a Tubojet Booster Ejector, as indicated in diagram with Barometric Condenser and a Two Stage Tubojet with Barometric Inter-Condenser, serving a High Vacuum Edible Oil Deodorizer.



C.H. Wheeler OF PHILADELPHIA

STEAM CONDENSERS • WATER COOLING TOWERS
EJECTORS • STEAM JET VACUUM REFRIGERATION

NEW CONSTRUCTION

Proposed Work

Calif., Richmond—U. S. Rubber Co., 300 Second St., San Francisco, plans to construct a rubber plant here. Estimated cost $1,000,000.

Ga., Valdosta—The Glidden Co., 52 Vanderbilt Ave., New York 17, N. Y., plans to construct an addition to its plant for the manufacture of gum turpentine and rosin. Estimated cost $100,000.

La., Baton Rouge—Ethyl Corp., North Baton Rouge, plans to construct a new sodium Change House No. 3. Bodman & Murrell, 713 Reymond Bldg., Baton Rouge, Archts.

Pa., Easton—General Aniline & Film Corp., 230 Park Ave., New York, N. Y., plans the construction of a central research laboratory. Estimated cost $390,000.

Pa., Franklin—Franklin Creek Refining Corp., Franklin, plans to construct a 2 story power plant at its refinery. Estimated cost $100,000.

Pa., New Hope—Union Mills Paper Manufacturing Co., New Hope, plans to alter and rehabilitate its plant. Gruenwald & Niemitz, 44-27 Purvis St., Long Island City, N. Y., Archts and Engrs. Estimated cost $70,000.

Tex., Houston—Humble Oil & Refining Co., Humble Bldg., plans to construct a bulk station and office building, also truck loading platforms, garage, repair shop and miscellaneous buildings. Estimated cost $300,000.

Tex., Houston—Reichhold Chemicals, Inc., 601 Woodward Heights, Ferndale, Detroit, Mich., plans to construct a resin manufacturing plant now and an additional unit later. Estimated cost $500,000 and $1,000,000 respectively.

Tex., Wichita Falls—Chickasha Cotton Oil Co., Wichita Falls, plans to reconstruct its cottonseed storage building. Estimated cost $75,000.

B. C., Prince Rupert—Columbia Cellulose Co., Ltd., Prince Rupert, plans to construct a pulp plant. Estimated cost will exceed $500,000.

N. S., Halifax—Mardan Wild of Canada, Ltd., Rockhead, plans to enlarge its marine oil manufacturing plant. Estimated cost $75,000.

Ont., Marathon—Marathon Paper Mills of Canada, Ltd., 330 Bay St., Toronto, plans improvements to its plant including a sulphite mill. Estimated cost $1,500,000.

Contracts Awarded

Ala., Birmingham—Lone Star Cement Co. c/o Tidewater Construction Co., 538 Front St., Norfolk, Va., contractor, will construct additions to its plant. Estimated cost $160,000.

	Current Projects		Cumulative 1948	
	Proposed Work	Contracts	Proposed Work	Contracts
New England	.....	.....	$125,000	$4,130,000
Middle Atlantic	$560,000	$250,000	8,064,000	30,314,000
South	168,000	160,000	78,521,000	103,518,000
Middle West	.....	2,068,000	15,600,000	75,361,000
West of Mississippi	1,875,000	13,155,000	178,113,000	120,945,000
Far West	1,000,000	2,050,000	14,918,000	37,876,000
Canada	2,075,000	3,690,000	92,125,000	42,489,000
Total	$5,678,000	$21,373,000	$387,466,000	$443,633,000

Ariz., Rillito—Arizona Portland Cement Co., Rillito, has awarded the contract for a 2,000 bbl. capacity cement plant consisting of more than 20 buildings, including three crusher buildings, rock storage building, mill building, three cement silos, packing house, six proportioning silos, three kiln silos, cooler and burning buildings, to Fisher Contracting Co., South 19th Ave., Phoenix. Estimated cost $1,300,000.

Calif., Berkeley—Colgate-Palmolive-Peet Co., Jersey City, N. J., has awarded the contract for additions to its plant at 6th and Carlton Sts., to Cahill Bros., 206 Sansome St., San Francisco. Estimated cost $450,000.

Ind., Whiting—Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York, N. Y., has awarded the contract for a steam generating and power plant to Day & Zimmerman, Inc., Packard Bldg., Philadelphia, Pa. Estimated cost $2,000,000.

O., Barberton—Columbia Chemical Div. of Pittsburgh Plate Glass Co., Barberton, has awarded the contract for a laboratory building and installation of coal handling system, to Heller-Murray Co., 222 Raven Ave., Youngstown. Estimated cost $500,000.

Pa., Eddystone—Vanadium Corp. of America, Niagara Falls, N. Y., has awarded the contract for renovating its factory and office building here to Hadley Contracting & Construction Co., 1213 Wood St., Philadelphia. Estimated cost $100,000.

Pa., Ellwood City—American Window Glass Co., Farmers Bank Bldg., Pittsburgh, Pa., has awarded the contract for a 1 story, 100x120 ft. addition to its plant to Mathew Tiero, 321 Lawrence Savings & Trust Bldg., New Castle, Pa. Estimated cost $75,000.

Pa., Falls Creek—Jackson Vitrified China Co., 2675 Bailey Ave., New York, N. Y., has awarded the contract for a 2 story china manufacturing plant addition here to R. K. Reznor Associates, 1717 Chestnut Bldg., Pittsburgh. Estimated cost $75,000.

Tex., Dallas—Freedom-Valvoline Oil Co., Freedom, Pa., has awarded the contract for the construction of a warehouse at its plant here to F. S. Oldt Co., 403 South Haskell St., Dallas. Estimated cost $70,000.

Tex., Houston—Atlas Mineral Products of Texas, Old Liberty Rd., will improve and enlarge its plant for the manufacture of sulphur cement. Work will be done with own forces. Estimated cost $95,000.

Tex., Rankin—Plymouth Oil Co., W. M. Griffith, Vice Pres., Sinton, Tex., has awarded the contract for the construction of a gasoline plant to have a daily capacity of 70,000,000 cu. ft., to Hudson Engineering Corp., 2711 Danville St., Houston. Estimated cost $5,500,000.

Tex., Rankin—Slick-Urschel Oil Co., Milam Bldg., San Antonio, has awarded the contract for the construction of a gasoline plant to have a daily capacity of 80,000,000 cu. ft., to Texas Natural Gasoline Corp., Milam Bldg., San Antonio. Estimated cost $6,000,000.

Tex., Wichita Falls—Panhandle Producing & Refining Co., Panhandle Bldg., will enlarge the cracking plant at its refinery. Work will be done with own forces. Estimated cost $1,000,000.

Wash., Ruston—American Smelting & Refining Co., Ruston, will construct a building to house its sulphuric acid plant. Work will be done by day labor. Estimated cost $300,000.

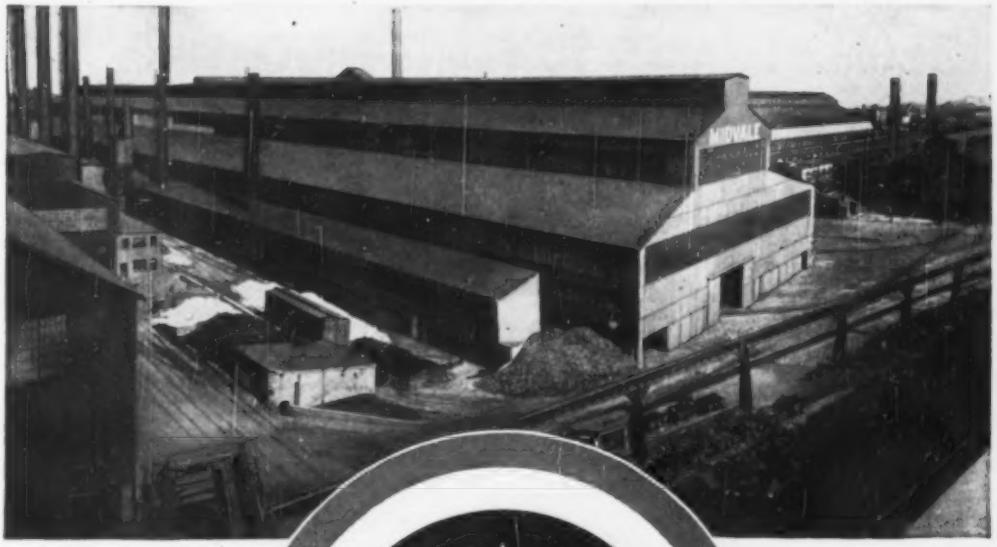
Wis., Milwaukee—Nitrogen Co., Inc., 3747 North Booth St., has awarded the contract for a 1 story, 96x96 ft. factory addition to Dan Schranka, 1006 East Colfax Pl.

Alta., Edmonton—Imperial Oil Ltd., 50 Church St., Toronto, has awarded the contract for enlarging its refinery to W. M. Barnes Co., 727 West 7th St., Los Angeles, Calif. Estimated cost $2,500,000.

Ont., Kitchener—Goodrich Rubber Co., of Canada, Ltd., 7 King St., W., has awarded the contract for an addition to its plant here to Ball Bros., Ltd., 49 East King St. Estimated cost $90,000.

Ont., Lindsay—Visking Corp., 6733 West 65th St., Chicago, Ill., manufacturer of cellulose tubing, has awarded the contract for the construction of a plant here to A. W. Robertson, Ltd., 57 Bloor St., Toronto. Estimated cost $1,000,000.

Que., Port Alfred—Aluminum Co. of Canada, Ltd., Sun Life Bldg., Montreal, has awarded the contract for reconstruction of its Bauxite plant to Foundation Co. of Canada, Ltd., 1900 Sherbrooke St., W., Montreal. Estimated cost $110,000.



SYMBOL OF THE FINEST

in quality steel making — the Midvale M-Star

For 81 years Midvale has been manufacturing many steel products for a wide range of use. The outstanding performance of these products has earned us an enviable reputation. We look forward to continuing improvement in the manufacture of high quality forgings and high alloy castings to maintain this reputation.

FORGINGS—FORGED, HARDENED AND GROUND ROLLS
WELDLESS RINGS—CORROSION AND HEAT RESISTING CASTINGS

THE MIDVALE COMPANY

NICETOWN • PHILADELPHIA

OFFICES: NEW YORK • CHICAGO • PITTSBURGH • WASHINGTON • CLEVELAND • SAN FRANCISCO

FROM RESEARCH TO PLANT PROCESSING . . . .

Condensers — Heat Exchangers — Jars — Ground Joint Apparatus —

Almost anything in PYREX brand laboratory ware can be produced on larger scale for plant processing. Take advantage of PYREX wherever possible.

PYREX brand glass No. 7740 is famous for its chemical stability . . . its high resistance to thermal and physical shock. First made available as laboratory ware, laboratory technicians quickly discovered that it paid off in longer service life and greater accuracy.

Laboratory ware also has its larger counterparts. Engineered to your needs, PYREX brand glass No. 7740 is available in the form of heat exchangers, condensers, coolers, reaction vessels for hydrolyzing, catalyzing and mixing, etc.

For more than 20 years, PYREX brand glass pipe lines have been used for the transfer of hot and cold liquids, especially those which are corrosive or easily contaminated. Its low cost and practical advantages have increased applications year after year.

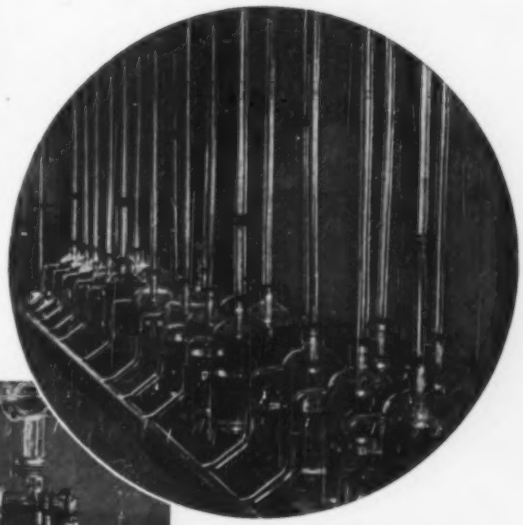
PROTECT YOUR PRODUCTS IN PYREX GLASSWARE!

BRAND

Flasks — Pipe and fittings enable you to start and finish in glass

It is truly possible for you to protect your products from research to plant process in PYREX brand glassware. You project the accuracy and purity of laboratory quality to the final product . . . with substantial savings in the form of better yields, the elimination of impurities, the reduction of obsolescence by corrosion.

Your laboratory dealer carries complete stocks of PYREX brand laboratory ware. For further information on PYREX pipe and plant equipment, write direct to us at Corning.



Whenever you use PYREX brand laboratory ware, consider the possibility of projecting it on larger scale with PYREX brand glass pipe and plant equipment.

PYREX brand glass pipe is available in 10 feet lengths in sizes from 1" to 4" I.D. with fittings to connect it together or to other plant equipment.

CORNING means research in GLASS

CORNING GLASS WORKS, CORNING, NEW YORK

For PYREX brand Laboratory ware, see your laboratory dealer.

For PYREX brand glass pipe and plant equipment, write or call Plant Equipment Department, Corning Glass Works, Corning, New York.

LASSES • LIGHTINGWARE • SIGNALWARE • OPTICAL GLASS • GLASS COMPONENTS

Here Is Why You Can
REDUCE PROCESS DOWN-TIME

When You Use *Carpenter* STAINLESS TUBING . . .

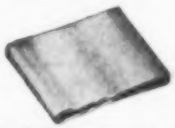
Longer equipment life with less time spent for tube replacement is one result you get by using Carpenter Stainless Tubing. For full corrosion resistance, plus the long service life that consistently uniform tube walls give you, specify Carpenter Stainless Tubing on every order.

And you save money in fabrication, too. Bending, expanding, joining, welding, etc., can be done rapidly to make trouble-free installations.

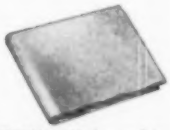
To prove that your process down-time can be reduced, drop us a line. We will be glad to work with your engineers.

Acid heater with removable bundle of 128 Carpenter Stainless Tubes, 1½" O.D., Type 316. Easy fabrication combined with long service life on process lines is the reason why the manufacturer always specifies Carpenter Stainless Tubing.

YOU GET LONGER EQUIPMENT LIFE with the Stainless Tubing That Passes These Tests—



FLATTENING TEST protects you against the possibility of O.D. defects. Specimen is flattened between parallel plates until distance between plates is 3 times the tube's wall thickness. Any sign of cracking or flaws is cause for rejection.



TRANSVERSE BEND is used to double-check the I.D. structure of Carpenter Stainless Tubing. Sample is slit longitudinally and then bent as in the flattening test, but in the opposite direction.

These tests, made at several stages of manufacture, prove quality of the entire tube section and are made on every lot of full finished Carpenter Stainless Tubing before it is released for shipment.

Carpenter

STAINLESS TUBING

"MORE THAN CORROSION RESISTANCE"

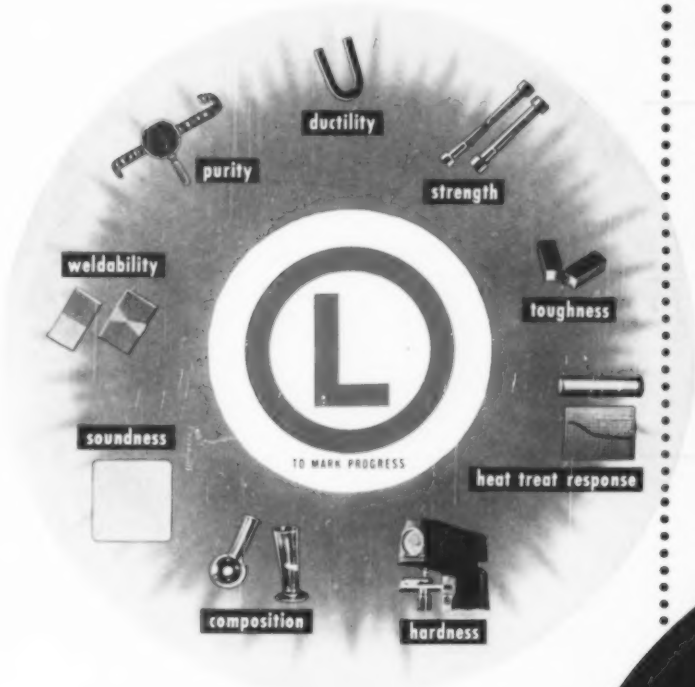
STAINLESS TUBING DATA to help you improve your product's performance is a part of Carpenter service. A note on your company letterhead will bring you a copy of the Carpenter Stainless Tubing Slide Chart containing data on physical properties, sizes available, etc.

THE CARPENTER STEEL COMPANY

Alloy Tube Division • 105 Springfield Road, Union, N. J.

Controlled Quality

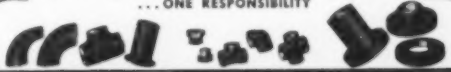
assures metal soundness



IN LADISH SEAMLESS WELDING FITTINGS

Each Ladish fitting has the chemical composition and physical properties essential for long, trouble-free operation under recommended service conditions. Laboratory test reports . . . pioneered by Ladish . . . provide an extra assurance of metallurgical soundness essential for dependable performance.

A COMPLETE LINE PRODUCED UNDER ONE ROOF
. . . ONE RESPONSIBILITY

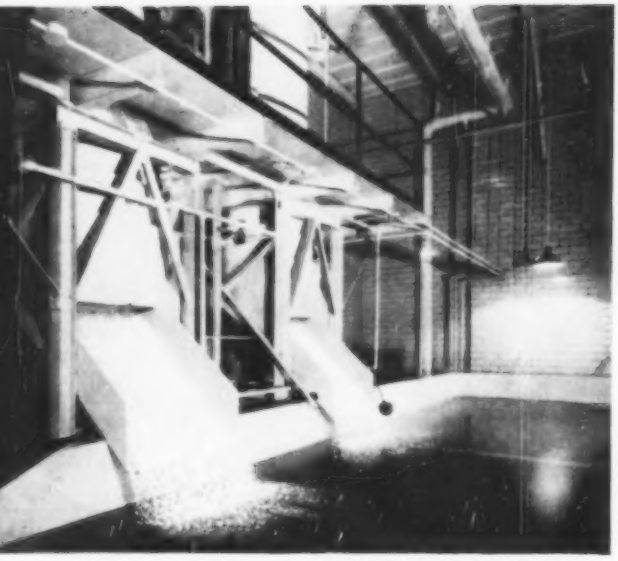


LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

DISTRICT OFFICES: New York • Buffalo • Pittsburgh • Philadelphia
Cleveland • Chicago • St. Louis • Atlanta • Houston • Los Angeles

NOW!
PROCESS INDUSTRIES SAVE 50% OF THEIR COLD WATER COST with....



Tube-Ice Machines and Latent Heat Water Tank at Burkhardt Brewing Co., Akron, Ohio.

Vogt *Automatic* TUBE-ICE MACHINE

HOW THE TUBE-ICE MACHINE FUNCTIONS

Patent Numbers 2,200,424, 2,239,234, 2,396,328. Other Patents Pending.

In making ice, water is pumped to the top of the freezer and flows downward along the inside walls of tubes into a water tank. Refrigerant in shell surrounds tubes and freezes water into cylinders of ice. An automatic timing mechanism operates suitable valves to control all functions of the machine. Ice is freed from the tubes by thawing when the refrigerant is displaced by high pressure warm gas from the compressor.

To cool water only, the suction valve is set to raise the evaporating pressure above that required for making ice.

Employing direct application of the refrigerant, all expense incidental to other systems is eliminated.

120 TONS OF CONNECTED REFRIGERATION CAPACITY PROVIDES THE EQUIVALENT OF 300 TONS REFRIGERATION DURING THE WORT COOLING PERIOD AT THE BURKHARDT BREWING CO., AKRON, OHIO, BY MEANS OF THE VOGT WATER COOLING SYSTEM PICTURED ABOVE!

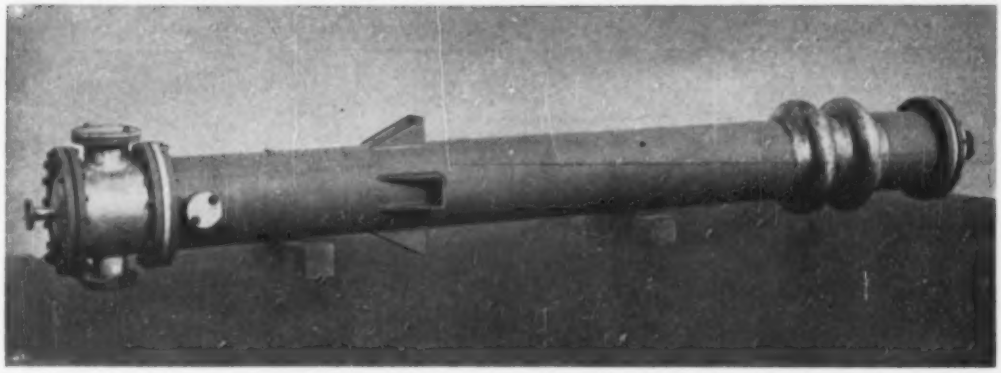
Here, Vogtice is made at night and stored in the water tank and cold water is made by the same machine during the day, thereby utilizing refrigerating capacity around-the-clock. The stored ice acts as a flywheel by cooling make-up water admitted into the tank to augment the supply made by the machine to meet the peak wort cooling loads. This system levels out refrigeration load demand with a resulting reduction in demand charges on electrical energy, and the use factor of installed equipment approaches 100%.

Dairies, Vegetable and Fruit Packers, Wax Paper Plants, Breweries, Rubber Mills, Bakeries, Soft Drink Bottlers, etc., can cut cold water cost to a new low by installing the Vogt water cooling system. And it is a "natural" for air conditioning in process plants where the demand for refrigeration is limited to 12 hours or less in any 24 hours. Theatres and department stores requiring no more than 12 hours of air conditioning per day can use this system with a refrigerating capacity but one-half or less of that otherwise required. Consult our engineers — no obligation.

HENRY VOGT MACHINE CO., Louisville, Ky.

BRANCH OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO, ST. LOUIS, DALLAS

it's ALUMINUM . . . CUSTOM-BUILT



Heat Exchanger, 13" diameter x 16' tube length. Tubes, tube sheets and heads of Aluminum 3S. Carbon steel shell and copper expansion joint.

by DOWNINGTOWN

Aluminum 3S and 2S are welded by Downingtown, using the "Heliarc" (Inert Arc) process, with high frequency alternating current. This method produces a dense weld of excellent appearance. There is no spatter and the weld is smooth.

For many corrosive conditions, aluminum can often be used successfully and economically. While the cost of aluminum is not low, the weight of the metal is such that the fabricated equipment which we are producing in our Heat Transfer Division sometimes results in a lower price than would be obtained by using other high priced alloys.

Aluminum has very good properties at low temperatures. Its impact values do not drop at low temperatures the way ordinary carbon steel drops, and again, suitable impact properties may be obtained by use of aluminum at a lower cost for equipment than by the use of other alloys which would be required to meet the conditions.

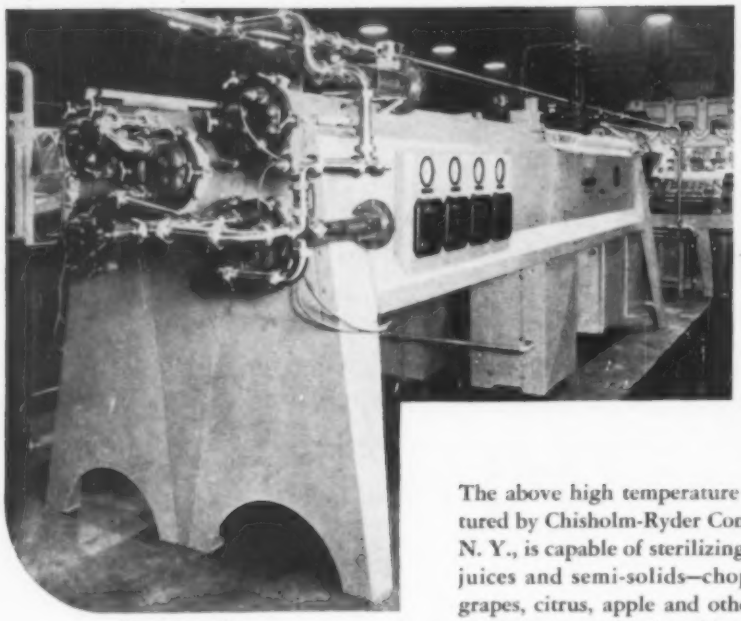
There are many problems requiring thought and experience in fabricating aluminum, such as warpage during welding, preheating and cooling rates, etc. We, at Downingtown, believe that we have been able to establish procedures which are of decided value in the handling of this material and invite your inquiry for heat exchanges and small diameter aluminum vessels.

Aluminum is only one of many alloys with which we work. The other metals include stainless steel, stainless clad, monel, solid and monel clad steel, cupro-nickel, silicon bronze, copper, phosphor bronze, etc.

Our Engineering Consultation is *at your service* to aid you in plans and specifications for definite jobs.

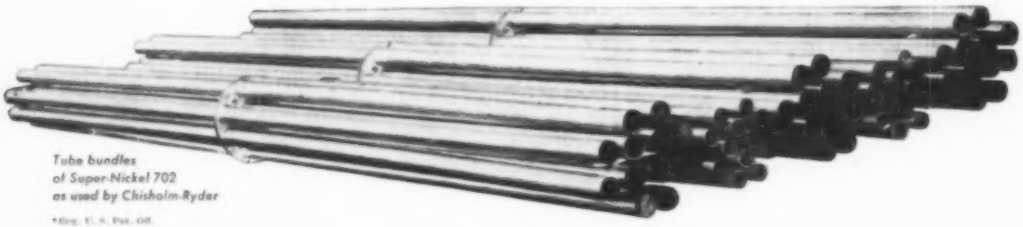
DOWNINGTOWN IRON WORKS
DOWNINGTOWN, PA.
HEAT EXCHANGERS

SUCCESS STORIES...



Anaconda Super-Nickel Tubes have Many Advantages in this Exchanger for Food Processing

The above high temperature heat exchanger, manufactured by Chisholm-Ryder Company, Inc., Niagara Falls, N. Y., is capable of sterilizing a wide range of extracted juices and semi-solids—chopped tomatoes, stemmed grapes, citrus, apple and other juices. The unit, which might be termed a "combination vacuum and pressure steam preheater, sterilizer and cooler," contains five tube bundles (shown below), each with twelve 20-foot Super-Nickel #702 (copper-nickel alloy 70-30) condenser tubes. Tube sheets, head plates and baffles are also Super-Nickel. By using Super-Nickel Alloy, the manufacturer claims he has obtained *greater heat conductivity, the strength to withstand high operating pressures, resistance to corrosion by most products encountered, toughness, durability and low cost.*

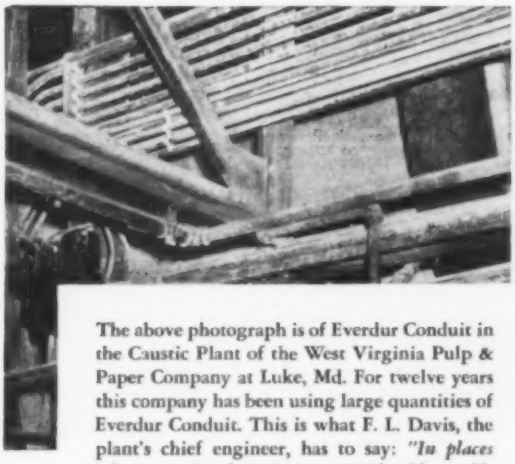


Tube bundles of Super-Nickel 702 as used by Chisholm-Ryder

*Reg. U. S. Pat. Off.

Our Technical Department is at Your Service to Help make Your Equipment Problems into Success Stories

with Anaconda Metals



Everdur* Electrical Conduit for Superior, Non-Rust Service in Corrosive Atmospheres

The above photograph is of Everdur Conduit in the Caustic Plant of the West Virginia Pulp & Paper Company at Luke, Md. For twelve years this company has been using large quantities of Everdur Conduit. This is what F. L. Davis, the plant's chief engineer, has to say: *"In places where corrosion has given us considerable trouble in the past, Everdur Conduit has been the answer. We find that it is economical to use Everdur Conduit in corrosive atmospheres and wherever circuits are subject to water washings from floors."* At another plant—the Acid Centrifuge Building of the Texas Company's Port Arthur, Texas plant —*Everdur Electrical Conduit installed in 1937 shows no evidence of deterioration despite constant exposure to corrosive vapors.*

Copper and Brass Mean Easy Fabricating and Efficiency in Double-Tube, Counterflow, Water-Cooled Condenser

The Halstead & Mitchell (Pittsburgh, Pa.) Double-Tube, Counterflow, Water-Cooled Condenser, for use in air-conditioning and refrigeration units, is unique in design, permitting easy access for cleaning of the inner cooling tube by simply removing plates at both headers. Like countless manufacturers of heat exchange equipment, Halstead & Mitchell rely on Anaconda Copper and Brass for their excellent heat transfer properties, adaptability to high speed machining and rapid, facile brazing. Corrosion resistance and high thermal conductivity are vital factors in the long term high efficiency of H & M Condensers. Concerning fast, easy fabrication with brass and copper, Halstead & Mitchell say: *"We have in the immediate past turned out as many as twelve thousand brazed joints without the necessity of repairing one leaker."*

ANACONDA

Anaconda

COPPER & COPPER ALLOYS

THE AMERICAN BRASS COMPANY

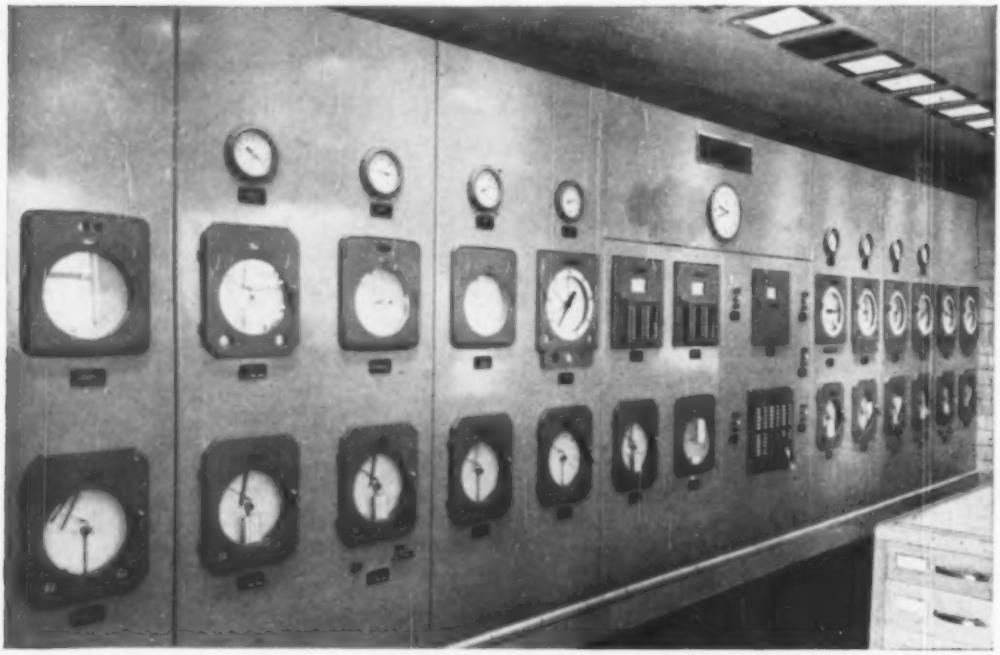
General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

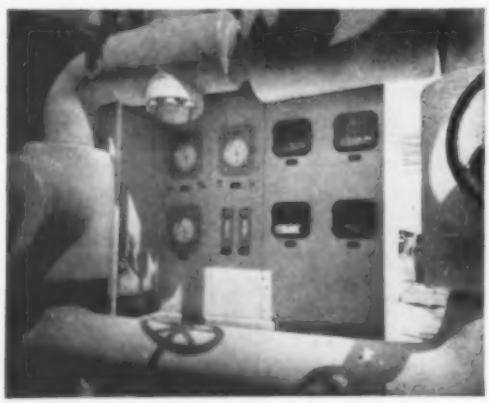
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

WHERE ACCURATE

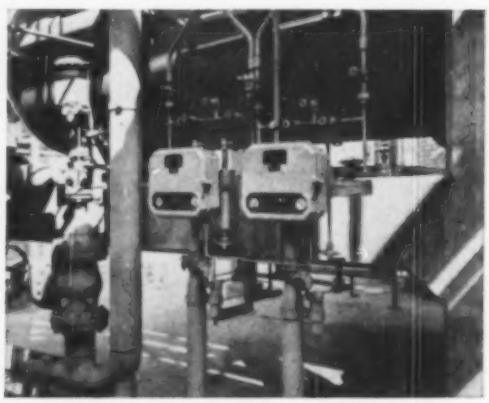
. . . Shell depends on Taylor Instruments at many



Control Control Room Instrument Panel at Shell Chemical Corporation's synthetic glycerine plant, Houston, Texas.



Taylor Fulscope Pressure, Flow, and Level Controllers at an outdoor control station.



Taylor Fulscope Indicating Flow Controllers locally mounted on plant equipment.

CONTROL IS VITAL

critical points in its new synthetic glycerine plant

TAYLOR INSTRUMENTS are helping make the industrial dream of a century come true at the Shell Chemical Corporation's huge new synthetic glycerine plant at Deer Park, Texas. In a multitude of essential operations at this plant, the world's first commercial synthetic glycerine plant, Taylor indicating, recording and controlling instruments are contributing to successful operation.

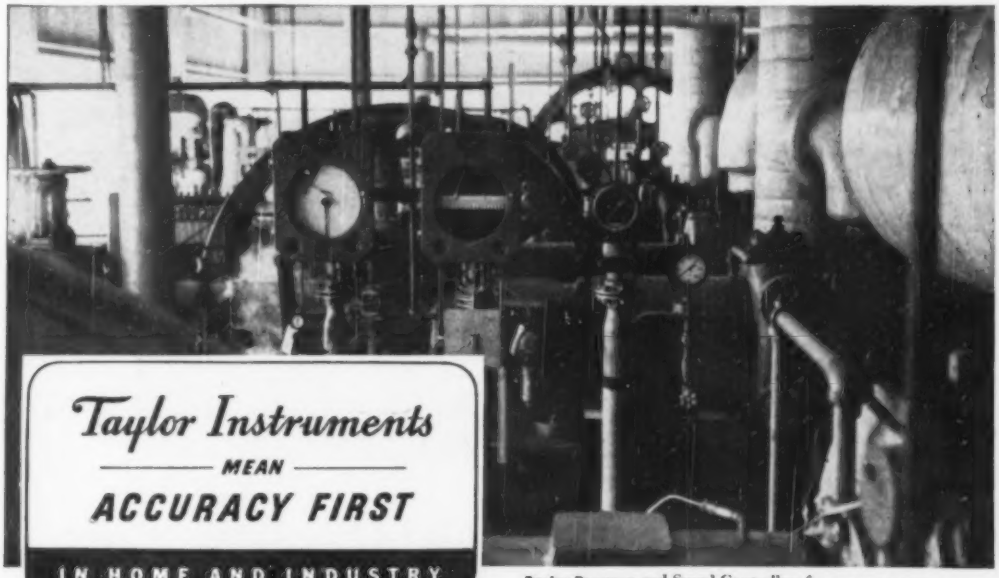
The $8,000,000 project began with a table-size laboratory model. For more than a decade, Shell scientists experimented with glycerine produced on this scale model until both product and process were perfected. Then blueprints of the process were turned over to C F Braun & Co, who built the new commercial plant.

Shell Chemical Corporation and C F Braun selected Taylor Instruments for an important part in the control of their synthetic glycerine process, and had the full cooperation of Taylor Field Engineers in tuning up the instruments before going on stream.

Whatever processing problems face you—from the simplest to the most complex—there's a Taylor Instrument or control system that can help you solve them. Ask your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

▼ ▼ ▼

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

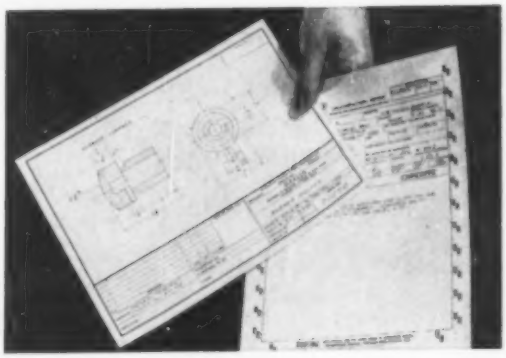


Taylor Pressure and Speed Controllers for gas compressor.

If you copy ANYTHING typed, drawn or written, you need OZALID!

It's Simple . . .

Take any letter, sales report, form, drawing . . . anything typed, drawn or written. Put it next to a sheet of Ozalid material (paper, plastic, cloth, black, blue, red, sepia) and feed it into an Ozalid machine.



It's Quick . . .

In as little as *25 seconds*, you (anyone can operate Ozalid) will have a *dry, positive, exact* duplicate of your original material! Ozalid copies can be used as masters to obtain more copies! No proofreading . . . no mistakes . . . no delay!

It's OZALID!

You can make Ozalid copies any length, and almost any width. You can make them directly from translucent material, and from opaque originals with an intermediate step.

Write today on your letterhead for FREE booklet which tells the full Ozalid story, shows all the Ozalid prints, or consult your classified directory for local distributor.

Don't copy... ***use*** **OZALID!**

Dept. 6, Johnson City, N. Y.

A Division of General Aniline & Film Corporation. *"From Research to Reality"*

2 TO 20 TIMES ----- FASTER!

ON TOUGH DISSOLVING & DISPERSING JOBS

With an impeller that elevates and swings in a 180° arc, model B is suited to rapid processing of batches brought to the machine in containers.

COWLES
Ultra-Fast
DISSOLVER
Faster because it develops laminar interface shear

Model A has a tank especially designed for the Cowles Ultra-Fast impeller. Available with a heat exchanger in the base, it increases solubility, reduces undissolved residues and is easy to clean.

Two to twenty times faster than conventional mixers, the Cowles Ultra-Fast Dissolver has an impeller of advanced design that sets up components of laminar flow, producing interface shear between multiple laminae with a high velocity gradient. The combined area of the many surfaces exposed to the shearing action plus the thinness of each laminae, subjects every particle in the batch to shear and scrubbing forces, greatly accelerating the dissolving and dispersing action.

Practically pure solutions and intimately-mingled colloidal dispersions are produced. There is no wait for undissolved residues or suspended solids to go into solution . . . no slow feeding . . . no clumping or balling of the dispersed medium in process. Splash and dead spots are virtually eliminated.

Safe, Silent, Long-Wearing

A high degree of balance in the rotating parts, coupled with rubber mountings, eliminates noise and destructive vibration. The rugged structure of the machine, the proved quality of the bearings and motor, all insure long life and low maintenance. For volatile and flammable solvents, solutes or sols, an explosion-proof motor, non-sparking tank and impeller—each adequately grounded for extra safety—are available.

Tanks and Removable Tank Models

The Cowles Dissolver is available from stock with tanks of 100 gal., 250 gal., or 500 gal. capacity; also in models for use in tanks or containers brought to the machine. Motor speed, horsepower and design of impeller are all adjusted to the gallonage, viscosity, physical and chemical properties of the materials you wish to process.

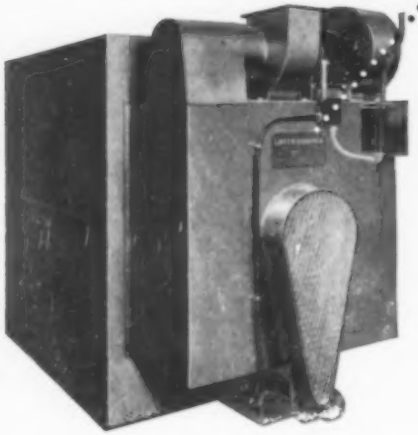
Tell us what your problem is. Write for a descriptive folder . . . or ask for a technical representative to discuss the matter with you. No charge. No obligation.

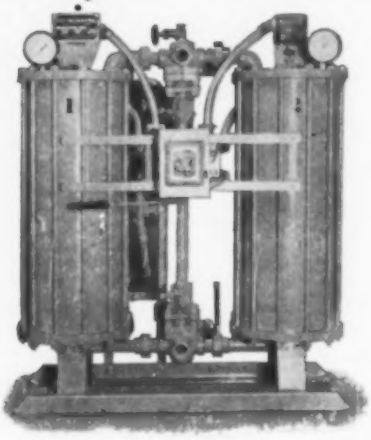
YEARS OF COMMERCIAL TEST SHOW COWLES DISSOLVER UP TO 10½ HOURS FASTER ON TYPICAL OPERATIONS

Type Operation	Material	Cowles Dissolver	Standard Mixer
Gum Cutting	Rosin	1½ Hrs.	12 Hrs.
Synthetic resin dissolving	Vinylite	1 Hr.	6 Hrs.
N/C solution	Nitrocellulose	12 Min.	90 Min.
Tinting	Enamel	5 Min.	30 Min.
Pigment dispersion	Heavy Enamel	6 Min.	150 Min.
Coating suspension	H. T. Clay	1 Hr.	9 Hrs.

The Cowles Company
INCORPORATED
CAYUGA, N. Y.

TRADEMARK FOR DEHUMIDIFIERS





You see dehumidifiers bearing this familiar nameplate—Lectrodryer—in hundreds of plants and dozens of industries all over the world. Ever since 1932, they have been helping to speed production and maintain high quality by removing moisture to uniformly low dewpoints.

LECTRODRYER is the name of a large family of DRYing machines. They range in size from the tiny Laboratory model, capable of handling a few cubic feet per hour, to the giant wind tunnel installation handling three tons of air per minute. They DRY air, gases and organic liquids.

You benefit by this sixteen years' experience when you consult Lectrodryer engineers on your DRYing problems. Recommendations on plant layout, controls and other auxiliary equipment are all co-ordinated with the type and size of machine prescribed for the job. You save time and money, and are assured of most efficient operation.

Remember the word LECTRODRYER and, when you need DRYing help, write Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sidney.

LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

REGISTERED TRADEMARK U.S. PAT. OFF.

NEW
BETH-FLO TUBE

Gives Higher Accuracy . . .

More Economy . . . Over a Greater Range

GENTILE PATENTS*

Now! An entirely new flow meter! Tested by one of the nation's leading hydraulic laboratories. Performance-proved for large savings in power, higher product quality, more economical installation.

It's the BETH-FLO TUBE, the first primary element ever to use viscosity as a criterion of flow. Wherever the rate of fluid flow must be measured, the Beth-Flo Tube offers:

- **A constant coefficent over an 8:1 range of discharge**
- **Negligible resistance to flow**
- **A differential greater than that of a Venturi tube or orifice meter**
- **Length normally less than 1 pipe diameter**
- **No straight run limitations**
- **Accuracy constant over the entire range of commercial flow measurement**
- **Metering of gases as easily as liquids**
- **Metering of both direct and reverse flow**

Full details are available in the folder, "BETH-FLO TUBE". For your copy write Bethlehem Foundry & Machine Company, Bethlehem, Penna., today.

*Pronounced Gentily

BETH-FLO TUBE

BETHLEHEM FOUNDRY AND MACHINE COMPANY

BETH-FLO TUBE

What Makes A Mailing *CLICK?*

Advertising men agree—the list is more than half the story.

McGraw-Hill Mailing Lists, used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power. They offer thorough horizontal and vertical coverage of major markets, including new personnel and plants. Selections may be made to fit your own special requirements.

New names are added to every McGraw-Hill list daily. List revisions are made on a twenty-four hour basis. And all names are guaranteed accurate within two per cent.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want. Ask for more detailed information today. You'll probably be surprised at the low over-all cost and the tested effectiveness of these hand- picked selections.

Direct Mail Division

McGraw-Hill Publishing Co., Inc.
330 West 42nd Street *New York, 18, N. Y.*

WHERE TO BUY

Featuring additional Equipment Materials, Supplies and Service for the Process Industries

WEIGH MATERIALS WHILE CONVEYING
with the
MERRICK WEIGHTOMETER
MERRICK SCALE MFG. CO.
171 SUMMER ST., PASSAIC, N. J.

"SAVES $600 a year in shipping room," say users of Marsh Stencil Machines. Brushes, Inks! Electric and Hand Operated machines cut ½", ¾", 1" letters. For sample stencil, Shippers' Handbook, prices, pin this to business letterhead with your name.

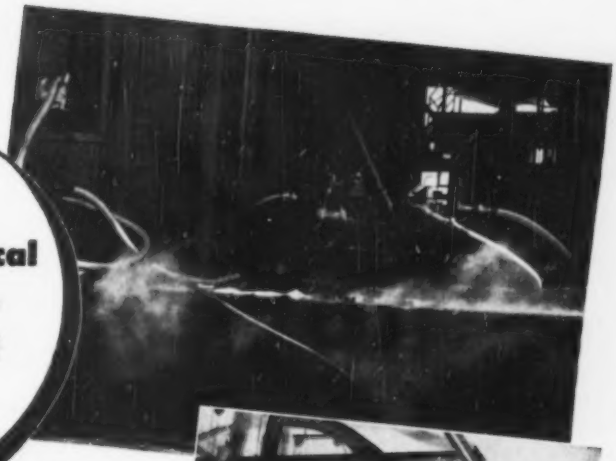
MARSH STENCIL MACHINE CO.
43 Marsh Building • Belleville Ill., U. S. A.

ACID AND ALKALI PROOF LININGS AND MORTARS
•
ACID PROOF CONSTRUCTION
•
THE CEILCOTE CO.
Design—Materials—Construction
[illegible] ROCKEFELLER BLDG.
CLEVELAND, OHIO

SPRAY DRYING SERVICE, INC.
Custom and Job Lot Spray Drying—Our Specialty
501 NORTH AVENUE • PHONE: WEstfield 2-1829 • GARWOOD, N. J.

When you're in need of some product or service to speed and improve operation, or save money, you may find it here—in the Where To Buy Section. It pays to check this page . . . *each issue.*

Here is the dependable, economical flexible metal hose for a wide range of applications



REX-TUBE

convoluted flexible metal hose

Where adaptability, durability and economy must be considered in the selection of flexible metal hose, CMH Rex-Tube should be the answer. Rex-Tube is made in eight basic wall formations for countless applications from protective conduit to conveying steam and liquids. Types of construction include square locked, double groove (ball bearing design) and fully interlocked. A variety of base metals and choice of packings are available. Couplings are available for each hose type as required. Write for complete information and specification sheets on the hose type best suited to your requirements.

Rex-Tube is one of the *basic types* of CMH's extensive line of flexible metal hose products.

A FEW OF THE MANY REX-TUBE APPLICATIONS

Conduit • Capillary Casing • Ducting • Exhaust Tubing • Low to Moderate Pressure Oil and Steam Lines • Vacuum Tubing • General Utility

"FLEXON" identifies CMH products, which have served industry for more than 45 years.

"the science of FLEXONICS . . ."the controlled bending of thin metals for use under varying conditions of temperature, pressure, vibration and corrosion" . . . is exemplified in the basic products of Chicago Metal Hose Corporation.

CMH FLEXIBLE METAL HOSE

CHICAGO METAL HOSE CORPORATION

Maywood, Illinois

Plants at Maywood, Elgin and Rock Falls, Illinois

In Canada: CANADIAN METAL HOSE CO., Brampton, Ont.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

Does your advertising manager rate an invitation to the management table?

IF YOU SHOULD ASK *him*, he'd probably say "yes." And his reasoning might run something like this:

Management's first responsibility is to show a fair profit. This requires a relentless search for continued improvement – in design, in purchasing, in production, research and cost-accounting. Each deserves its place at the management table. Yet none of these activities can actually create a dollar of profit, for the simple reason that you can't *produce* anything at a profit – not unless you can also *sell* it.

And that's what makes the advertising manager's job so important.

His first responsibility is to see that your company's products are made familiar (and desirable) to the greatest number of prospects, at the lowest possible cost. In fulfilling this responsibility, he sets a parallel course with the sales department, although his approach more closely resembles that of the assembly line technician.

For advertising, as he sees it, is simply the application of assembly line techniques to the *manufacture of a sale*. Just consider the five basic steps involved:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

By *mechanizing* the first three of those steps, advertising increases management's chance to show a profit. It leaves your salesmen free to concentrate on the two jobs which they alone can do, and do best.

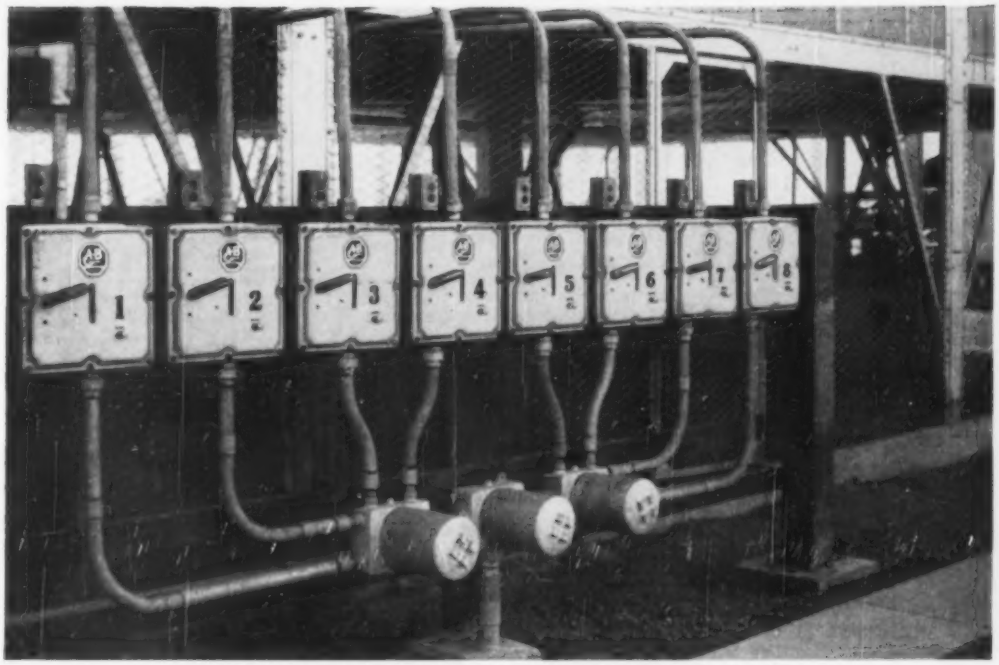
And nowhere does this mechanizing process operate more efficiently than in the business press, where it reaches your best prospects at the lowest possible cost.

Perhaps that's why so many smart advertising managers are partial to business paper advertising – and why more of them, incidentally, are getting to sit at the management table!

CHEMICAL ENGINEERING
With Chemical & Metallurgical Engineering
A McGraw-Hill Publication
330 West 42nd Street New York 18, New York

THE ASSOCIATED BUSINESS PAPERS
205 East 42nd Street, New York 17, N. Y.

ABP's BUSINESS IS TO BOOST YOUR BUSINESS

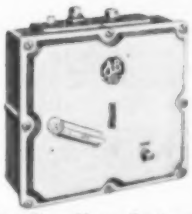


Installation of Allen-Bradley Watertight Bulletin 713 Combination Starters in Texas gasoline plant.

NO CONTROL TROUBLES *in any Weather*

with these A-B Watertight Starters

BULLETIN 713 Combination Starter in Watertight Enclosure



Here is a row of Allen-Bradley Combination Starters in which the motor starter and disconnect unit are mounted together in one compact, watertight enclosure. Bolted covers with gaskets provide complete starter protection under all weather conditions.

The Allen-Bradley solenoid switch, in these starters, has double-break, silver-alloy contacts which are maintenance free . . . a decided asset for switches with bolted enclosures. Dependable relays, easily reset without opening cabinets, provide accurate overload protection.

For safe, trouble-free motor controls in refineries, chemical plants, and process industries, specify Allen-Bradley motor controls.

Allen-Bradley Company
1337 S. First St., Milwaukee 4, Wis.

Allen-Bradley Automatic Starters are also available in these enclosures

GENERAL PURPOSE
NEMA Type 1. Pressed steel enclosure. Black enameled exterior; bright white interior.

DUST-TIGHT
NEMA Type 5. For non-hazardous dust locations. Has thick felt gasket for cover seal.

WATERTIGHT
NEMA Type 4. For dump or wet installations. Base and cover with Hycar gasket seal.

FOR HAZARDOUS LOCATIONS
NEMA Type 7. For Class 1, Group D, hazardous gas locations.

FOR CORROSIVE LOCATIONS
NEMA Type 11. Starter, supported by steel hood, is immersed in oil.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

A-B Quality

PROFESSIONAL SERVICES

PATENTS · REPORTS · TESTING · PLANT DESIGN · INVESTIGATIONS · GENERAL CONSULTING · RESEARCH · MANAGEMENT · TRANSLATIONS

CHEMICAL AND BACTERIOLOGICAL ANALYSIS

W. Y. AGNEW
CONSULTATION - EQUIPMENT - DESIGN
Nitrogenous & Phosphatic Fertilizers
Pigments including Titanium Oxide
Caustic-Chlorine, Permanganate
Inorganic - Organic - Electrolytic
500 Fifth Avenue, New York 18, N. Y.

CLEVELAND B. HOLLABAUGH, PH.D.
- Chemical Patent Matters -
113-27 177th St., St. Albans, New York City
Telephone—JAmaica 6-3348

MARCUS SITTENFIELD
Consulting Chemical Engineer
Plants - DESIGN - Equipment
Economic - SURVEYS - Technical
Process - DEVELOPMENT - Product
Registered Professional Engineer
1441 S. Broad St. Philadelphia 47, Pa.

R. S. ARIES & ASSOCIATES
Chemical Engineers & Economists
NEW PRODUCT DEVELOPMENT
Process Analysis · Technical & Economic Surveys
Market Research · Plant Design
Appraisals
26 Court Street Brooklyn 2, N. Y.

JOHN C. KALBACH
Consulting Chemical Engineer
Fluidization · Gasification of Fuels
Consultation · Pigment Technology
Reports · Research Supervision
3900 Greystone Ave., New York 63, N. Y.

J. E. SIRRINE COMPANY
Engineers
Plant Design & Surveys covering Chemical, Electrochemical and Metallurgical Production; Trade Waste Disposal; Water Supply & Treatment; Analyses & Reports
Greenville - - - - - - South Carolina

W. L. BADGER
CONSULTING CHEMICAL ENGINEER
Evaporation, Crystallization, and Heat Transfer; Complete plants for salt and caustic soda; Complete Dowtherm installations.
209 South State Street, Ann Arbor, Mich.

KNOWLES ASSOCIATES
Chemical—Metallurgical—Mechanical Engineers
Consultation — Design
Complete Plants — Equipment
Cement—By-Product Feeds—Phosphates
Starch—Drying—Classification—Dewatering
19 Rector Street, New York 6, New York
Bowling Green 9-3456

FOSTER D. SNELL, INC.
Research Chemists and Engineers
A staff of 75 including chemists, engineers, bacteriologists and medical personnel with 16 stories of laboratories and a pilot plant are available for the solution of your chemical and engineering problems.
Write today for Booklet No. 2
"The Chemical Consultant and Your Business"
29 West 15th St., New York 11, N. Y.

J. PAUL BISHOP AND ASSOCIATES
Consulting Chemical Engineers and Food Technologists
Reports — Layouts — Unit Operations — Drying—Evaporation—Filtration—Atmospheric Pollution—Food Engineering — Food Bacteriology — Freezing Equipment, Process and Product Design—Instrumentation — Industrial Heating, Ventilating, Air Conditioning and Refrigeration.
Write for brochure—mentioning this publication.
105 North Second Street, Champaign, Illinois

KOHN & PECHENICK
Consulting Chemical Engineers
Plants — Process — Equipment
DESIGN
Reports · Trouble-Shooting · Appraisals
Architects Building, Philadelphia 3, Pa.

CARL A. STEVENS
Professional Engineer
Investigations · Designs · Engineering
for Manufacturing and Processing Plants in
OKLAHOMA AND THE SOUTHWEST
Special Service to Small Industries
3012 E. 15th Street, Tulsa 4, Oklahoma

CARL DEMRICK
Technical Translations
Send for Circular
53 So. Broadway, Yonkers, N. Y.

LANCASTER, ALLWINE & ROMMEL
Registered Patent Attorneys
Patent and Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.
Suite 447, 815-15th St. N. W., Wash. 5, D. C.

NICOLAY TITLESTAD CORPORATION
Chemical Engineers
Design — Consultation — Complete Plants
sulphuric acid — phosphoric acid
nitric acid — oxidation of ammonia
nitrogen products — acid concentration
sulphur dioxide — carbon bisulphide
11 W. 42nd Street, N. Y. 18—LO-4-5870

RALPH L. EVANS ASSOCIATES
Consultation
Fundamental Research
Management
250 East 43d St., New York 17, N. Y.

C. L. MANTELL
Consulting Chemical Engineer
Process Research and Engineering
Development
451 Washington Street, New York 13, N. Y.

MARVIN J. UDY
Consulting Engineer
Inorganic Chemistry, Electrochemistry, Electric Furnace Smelting, Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorus
Telephone 2-6294
540 Portage Road, Niagara Falls, N. Y.

EVANS RESEARCH AND DEVELOPMENT CORPORATION
Organic and Inorganic Chemistry
Processes—Products
250 East 43d St., New York 17, N. Y.

PROJECT CONSTRUCTION CORPORATION
SMALL PLANT SPECIALTIES
PILOT PLANTS PROCESS EQUIPMENT
Design - Fabrication - Construction
115 Fulton Street, New York 7, N. Y.

A. WEISSELBERG, M. E.
Designers of special equipment and complete plant layouts. Specializing in Quality Drying.
Established 1939
31-04 Northern Blvd.
Long Island City, N. Y.

FRASER-BRACE ENGINEERING CO., INC.
DESIGN - CONSTRUCTION - REPORTS
APPRAISALS
COMPLETE MANAGEMENT OF PROJECTS
10 East 40 Street, New York 16, N. Y.

GUSTAVE T. REICH
Consulting Chemical Engineer
DEVELOPMENTS—OPERATION
CARBOHYDRATE INDUSTRY—BY-PRODUCTS
CARBON-DIOXIDE—WASTE DISPOSAL
Packard Building, Philadelphia, Pa.

THE J. G. WHITE ENGINEERING CORPORATION
Design-Construction-Reports-Appraisals
80 Broad Street, New York 4

You may have *plenty* of extinguishers . . . BUT are you *sure* they're ready for action?

Periodic inspection and maintenance, recharging when necessary . . . these steps are essential to keep your fire extinguishers ready for *immediate* action.

Perhaps this involves a serious drain on the time of your personnel—who may be urgently needed for productive tasks. If so, here's a suggestion.

Why not let your Kidde representative take on the job?

He is prepared to offer you, on an annual contract basis, a comprehensive service covering all phases of fire-extinguisher service. He will call at regular intervals, to check the condition of your equipment, and will let you know immediately when recharging and repairs are needed. He has full facilities for the actual handling of the recharging or repairs.

Such an arrangement can help you, in other ways, to make most effective use of your fire extinguishers. As a specialist in fire-fighting, your Kidde representative may be able to *locate* your extinguishers to better advantage. Perhaps one extinguisher is hard to reach. Perhaps two types of extinguishers would give better protection if their positions were interchanged. You'll find such a service well worthwhile—why not look into it?

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

Walter Kidde & Company, Inc. • **128 Main St., Belleville 9, N. J.**

SEARCHLIGHT SECTION

WANTED

CHEMICAL ENGINEER

Midwestern cement company has opening for a young Chemical Engineer for handling production and field service problems. Some experience in cement industry desirable.

Submit complete resume of qualifications and salary expected.

Petoskey Portland Cement Co.
Petoskey, Michigan

WANTED

SALES ENGINEER

New England manufacturer of industrial instruments offers permanent home office position to graduate mechanical or chemical engineer having actual field experience with process instrumentation. Position involves application engineering, sales correspondence, infrequent traveling. Selling experience helpful but not required. Members of our organization know of this advertisement. Write fully, detailing education and experience.

P-7355, Chemical Engineering,
330 West 42nd Street, New York 18, N. Y.

INDUSTRIAL SALES MANAGER

Extensive practical experience in all phases of welding; thorough knowledge of metallurgy, gases and equipment essential; must have proved management ability; age 30-35; unusual opportunity for permanent connection in long established Company with A1 rating; Middle West. Give details of education, experience, approximate salary expected, etc. Replies strictly confidential.

P-7458, Chemical Engineering
520 North Michigan Ave., Chicago 11, Ill.

WANTED

Representatives

Established sales agent representatives. Individually assigned territories throughout country. Commission basis. Knowledge materials handling, pneumatic conveying, dust collecting, patented equipment and other related machines for process industries. An old established firm of Engineers and Manufacturers. Reply in detail.

RW-7369, Chemical Engineering,
330 West 42nd Street, New York 18, N. Y.

PLANT ENGRS - CHEML - MECHL

"Some Exp. Nec. Good Future. Mid-West." Process Control Superv.—$4500. "Exp. in Natural or Synthetic Rubber." Young Chemists-Chem. Engrs. Open.
Inquiry Invited—Strictly Confidential
SHAY AGENCIES
30 W. Washington Chicago 2, Ill.

CHEMICAL ENGINEERS

We need top grade men for positions demanding sound experience. Right salaries to the right men! Confidential service.
JUNIORS ALSO INVESTIGATE
No! Write or wire
GLADYS HUNTING
CASTLE & ASSOCIATES, INC.
220 S. State St. Chicago 4, Ill.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

CHEMICAL ENGINEER—Ten to fifteen years experience supervision of research and development work, pilot-plant demonstrated ability to get results. Salary commensurate. Long established organic chemical company, eastern U. S. Send complete information, including salary desired. P-7063, Chemical Engineering.

CHEMIST, Ph. D.—Experienced. Interested in developing new organic products commercially. Capable of supervising other high grade research chemists. An excellent opportunity for hard working ambitious man. Large company, eastern seaboard. In reply include pertinent information and salary desires. P-7064, Chemical Engineering.

POST OF Works Superintendent in an Electrolytic Caustic Soda and Chlorine Plant situated abroad in the East. Applicant should be well qualified and considerably experienced in running, maintenance and development. He should preferably be conversant with the problems of Chlorine utilization and should be in a position to set up Pilot Plant and conduct operation leading to full development of chlorinated products-both organic and inorganic. Applications will be treated in strict confidence. P-7467, Chemical Engineering.

ENGINEER, CONSTRUCTION Estimator. Permanent position on Engineering Staff of national concern. Western Pennsylvania. Chemical or Petroleum industry experience desirable. To prepare cost estimates on building construction, equipment installation and piping. Give complete information in first letter. P-7396, Chemical Engineering.

SELLING OPPORTUNITY OFFERED

REPRESENTATION IN chemical processing field desired by one of largest and best equipped Pittsburgh fabricating plants, to sell the stainless and alloy requirements of the chemical industry. Excellent opportunity for extraordinary income made even better by new steel basing point ruling. Write giving details of sales experience, lines you now carry and present territory. The Converto Company, Box 4037, Pittsburgh 1, Pa.

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$25,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby, Inc., 260 Dun Bldg., Buffalo 2, N. Y.

EXECUTIVES $3,000-$25,000. This reliable service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. B, 241 Orange St., New Haven, Conn.

FOR SALE

Leitz Microscope,
new condition, mechanical stage, sub stage condenser, oil immersion objectives, substage lamp, complete with carrying case. L. Wolkowisky, 92 Sip Ave., Jersey City, N. J.

WANTED •

CHEMICAL PLANT

Large financially powerful diversified organization wishes to add another enterprise to present holdings.

CASH PAID

FOR CAPITAL STOCK OR ASSETS

Existing Personnel Normally Retained
Box 1221 1474 B'way, N. Y. 18, N. Y.

AVAILABLE . . .

RECOVERY FACILITIES

All types crude mixtures
DISTILLATION and EXTRACTION
High Temperature High Vacuum
Simple Distillation Difficult Fractionations
Separation of close-boiling liquids, isomers, and azeotropes our specialty
Drum Lots - Tank Cars

TRULAND
CHEMICAL & ENGINEERING CO., INC.
P. O. Box 426, Union, N. J. Unionville 2-7200

STAINLESS STEEL SPECIALISTS

STAMPED - FORMED - WELDED
STAINLESS STEEL PRODUCTS
Send drawings (Est. 60 Years)
C. W. CARLL SONS
Cole & Linwood Sts. Trenton 8, N. J.

You Get More — and Pay Less

THE Equipment Trading Post is organized for the purpose of locating idle equipment and placing it directly into the hands of users.

You get more money for your surplus machinery — or buy for much less. We make only a 10% brokerage from the seller.

Try us — we'll give you real action!

"We don't own a single piece of equipment"

EQUIPMENT TRADING POST
P. O. BOX 72 SAN FRANCISCO 1, CALIF.

WANTED
Medium size
Roto Louvre Dryer
BLOCKSON CHEMICAL CO.
Joliet, Illinois

WANTED - CHEMICALS

Dyes—Colors—Pigments
Oils—Waxes—Drugs
By-Products—Wastes—Equipment
CHEMICAL SERVICE CORP.
80A Beaver St. New York 5, N. Y.

GET MORE FOR YOUR SURPLUS EQUIPMENT

List it with our bureau
And Sell Directly to the next user

50,000 Manufacturers Get Our Offerings Regularly. They need such units as

FILTER PRESSES EVAPORATORS
STILLS MIXERS DRYERS

or what have you to sell?

For Quicker Action and Better Price, Send Full Details and YOUR Price to

EQUIPMENT FINDERS BUREAU
6 Hubert Street New York 13, N. Y.

TEMPERATURE CONTROLLERS

New Electronic Recording Controllers with pneumatic controls, mfg. by Brown Instrument Co. Quick delivery in most ranges at substantial savings. In inquiry, advise temp. range desired and couple.
CARR BROS. CO.
258 Park Sq. Bld. Boston, Mass.

LIQUIDATING the Machinery and Equipment of the Coated Fabrics Division of

ATLAS POWDER COMPANY

AT THEIR
STAMFORD, CONN., PLANT

It is still set up, as it was operating until a few days ago. This is your opportunity. Our representatives are at the plant now, ready to serve you.

"Consolidated"

Here Are Some of the Principal Items:

MIXERS

6—Steel Simplex Turbo Mixers, with bolted on covers, each with Turbo Mixer Drive 4B, Falk Motoreducer Ratio 6-1, and Louis Allis 15 HP. 3/60/220-440 1760 RPM Explosion proof motor and starters, capacity each Mixer 325 gals.

3—Steel Simplex Turbo Mixers, welded on dished covers. Each with Turbo Mixer Drive 5B, Falk Motoreducer, Ratio 7-1, and Louis Allis 30 HP. 3/60/220-440, 1750 RPM Explosion proof motor and starters, capacity each Mixer 950 gals.

4—Alsop Hyspeed back geared Portable Agitators, ½ HP. 3/60/220-440, back geared 430 RPM—2 Steel Propellers, 48" shaft, explosion proof motors.

1—Baker Perkins 100 gallon working capacity, jacketed, double geared, sigma blade, power tilting, motor driven Mixer, 40 HP. G.E. 3/60/440.

10—American Tool & Machine Co. all steel vertical Rubber Churns or Mixers, 36" x 50", 300 gals. each, belt driven agitator drives, paddle arm agitators, large molasses gate outlet.

3—J. H. Day 8 gallon Pony Mixers, tight and loose pulley.

2—J. H. Day 20 gallon Brighton Mixers, tight and loose pulley.

2—J. H. Day 40 gallon Change Can Mixers, tight and loose pulley.

1—Ross 40 gallon Change Can Mixers, tight and loose pulley.

RUBBER & PLASTICS COMPOUNDING

1—24" x 66"—3 roll Calender, herringbone gears throughout, with reduction drive, Variable Speed Motor, Controls and all accesories.

1—22" x 20" x 60" Erie Mill, installed new, 1948, with Reduction Drive, 125 HP Synchronous Motor & Controls.

1—Line of 2—22" x 20" x 60" Mills with reduction drive, motor and controls.

1—Line of 4—20" x 48" Mills with reduction drive, motor and controls.

1—18" x 48" Farrell Mill with reduction drive, motor and controls.

1—No. 3 Banbury Mixer, with motor and controls.

1—100 gallon Baker Perkins jacketed double arm Mixer, heavy duty, with drive and 40 HP Motor.

TANKS

2—Stainless steel Tanks each 350 gallon capacity, belt driven propeller agitators.

30—Vertical and horizontal steel, riveted and welded, from 2,000 gals. to 12,000 gals.

7—Blue enamel, 30" x 36", 100 gal. ea. Bolted on dished covers with 14" manhole, 3" bottom outlet, leg supports. 1 with enameled paddle agitator, belt driven.

PEBBLE MILLS & GRINDERS

14—P. O. Abbe 36" x 42" Burrstone and porcelain lined, tight and loose pulley drive, liquid discharge gate.

3—Colloid Mills, each directly connected to 2—Terry 10 HP. 3000 RPM Steam Turbines.

PUMPS

Viking Gear Pumps—all iron with safety valves. All directly connected to Explosion proof motors 3/60/220-440. Ranging from 1½" with 3 HP. to 4" with 20 HP. motors.

SCALES

Approximately 30 Toledo Dial Scales. Portable, Bench and floor type, range 500-3500 #.

SPEED REDUCERS & MOTORS

A large variety of Reeves Vari control, Falk & Link belt PIV reducers with motor assemblies ranging from 1½ HP. to 30 HP.

SOME OF THE PRINCIPAL ITEMS AT OUR NEWARK SHOPS

OLIVER ACID PROOF FILTER

8' dia. x 12' face—closed, lead covered heads, wood staves, 15" lead valve with Duriron wear plate, lead internal piping, lead lined trough, rubber covered oscillating agitator; rubber lined vacuum receiver.

ROTARY KILN

1—8' x 125' Reeves Bros. ROTARY KILN, ⅜" shell, 2 support type, 14" steel tires, 12" wide girth gear, equalizing type supports. KILN now in 1-125' section on cribbing alongside railroad siding for immediate shipment. Refractories removed.

DRYERS

6 x 50 Louisville Rotary Steam Tube.
6 x 23 Hersey Rotary Hot Air.
3'6" x 28' Direct Heat Rotary.
5' x 33' Rotary Vacuum.
32" x 72" Buffalo Double Drum Atmospheric.
28" x 60" B&C Double Drum Atmospheric.
Buffalo Vacuum and J. P. Devine Vacuum Shelf, 40 x 42, 5, 6, 9 Shelves.

CRUSHING & GRINDING, PULVERIZING

1—Raymond 5-roll High Side, complete with motor accessories.
2—Raymond No. 000 Pulverizers.
1—Raymond No. 0000 Pulverizers.
1—Size B—Erie City motor driven Coal Pulverizer.
1—Raymond 4-roll High Side.
1—Jeffrey 24 x 20, type B, Hammer Mill.
1—Williams 2XX Roller Bearing Hammer Mill.
1—Micro 4TH 24".
1—JB No. 2 Hammer Mill.

MIXERS

2—Baker Perkins, Size 17, Jacketed, 200 gallon capacity.
1—W & P, Size 10, Unjacketed, 150 gallon capacity.
8—Baker Perkins, Size 15, Jacketed, 100 gallon capacity.
1—W & P, Size 14, Unjacketed, 50 gallon capacity.
1—W & P, Size 12, Jacketed, 20 gallon capacity.
1—2,000 lb. J. H. Day Dry Powder, motor driven.
1—1,000 lb. J. H. Day Dry Powder, motor driven.
1—1,000 lb. Stedman Drum Mixer, motor driven.

FILTERS

1—No. 12 Sweetland, 4" centers, iron or copper leaves.
1—No. 10 Sweetland, 2" centers, iron or copper leaves.
1—No. 5 Sweetland, 2" centers, copper leaves.
1—8 x 12 Oliver Acid Proof.
2—8 x 12 Oliver all steel.
3—8 x 10 Oliver wood stave.
2—36" Sperry 60 plate cast iron. Recessed, center feed, open delivery, hydraulic closing.
4—30" Sperry Skeletons—gear closing.

ONLY A PARTIAL LIST—SEND US YOUR INQUIRIES

WANTED: YOUR IDLE MACHINERY SEND US YOUR LIST NOW!

THE KEY TO SAVING TIME AND MONEY

CONSOLIDATED PRODUCTS COMPANY, INC.

FOR OVER A QUARTER CENTURY A SYMBOL OF CONFIDENCE

15 Park Row, New York 7, N. Y.—Tel. BArclay 7-0600

Shops: 335 Doremus Ave., Newark, N. J. Cable Address: Equipment, N. Y.

WE BUY AND SELL SINGLE ITEMS TO COMPLETE PLANTS

ANNOUNCEMENT!

FOR YOUR CONVENIENCE

As of February 1st, 1949

Our EXECUTIVE OFFICES

Will be consolidated with

Our WAREHOUSES and SHOPS at

2401 THIRD AVE. (At 133d St.)

NEW YORK 51, N. Y.

SELECTED ITEMS

DRYERS

14—2 Truck Atmospheric Steam Heated Dryers, 300 sq. ft. drying surface each.
1—Devine 3'x14' stainless clad Rotary Dryer.
5—Allis Chalmers 9'x160', 9'x80' Rotary Kilns.
1—Vulcan 8'x125' Rotary Kiln.
3—Bonnot 5'x40', 3'x45' Rotary Dryers.
3—Ruggles-Coles Dryers 70"x35', 4'x20'.
5—Rotary Vacuum Dryers 30"x8', 4'x20', 5'x30'.
2—Buflovak Vacuum Shelf Dryers each with 20—42"x42" shelves.
2—Buflovak 32"x90" Atmospheric Double Drum Dryers.
1—Pfaudler 2'x10' glass-lined Rotary Dryer.

PULVERIZERS—MILLS

5—Abbe 8'x8', 5'x4' porcelain lined, jacketed Pebble Mills, motor driven.
1—Patterson 3'x4' steel lined Ball Mill.
1—Porter Multiple Jar Mill, 4—1 gal. jars, motor driven.
3—Porcelain lined Pebble Mills 3'x4', 2'x3'.
3—Mikro Pulverizers 3TH, 2TH, 1SH.
1—Fitzpatrick Type D Comminuter S. S.
2—Hardinge 3'x24", 6'x22" Conical Mills.
4—Raymond ⌀10 and ⌀50 Imp. Mills.
3—Raymond ⌀0 and ⌀00 Screen Mills.
1—Raymond 5 Roll High Side Mill ⌀5057.
2—Dixie Hammer Mills ⌀3020, ⌀2424.
1—"Jay Bee" Hammer Mill size 2UX.
2—Tyler-Hummer 3'x5', 4'x5' Screens.

FILTERS

1—Sweetland ⌀5 stainless clad.
1—Oliver 5'4"x8' Acid Vacuum Rotary.
1—Shriver 12"x12" Iron P&F 13 chambers.
2—Sperry 30"x30", 24"x24" Wood P&F.
2—Sperry 24"x24" Cast Iron P&F.
4—Sperry Type 30"x30" Cast Iron P&F.
3—Sperry 42"x42" Aluminum P&F.

CRYSTALLIZERS—KETTLES—TANKS

4—1600 gal. steel, closed, jacketed Tanks.
1—Struthers-Wells 400 gal. closed, jacketed, agitated Pressure Kettle, 5 HP motor.
4—Buflovak 6' Crystallizers, Vacuum and Atmospheric.
6—Dopp 250, 150 gal. steam jacketed, agitated Kettles, high pressure.
3—Pfaudler 75, 100, 150 gal. glass-lined, steam jacketed, agitated Kettles.
10—Metal Glass 25 to 100 gal. Tanks.
25—Stainless Steel Kettles, Tanks, 50 to 500 gal.

CENTRIFUGALS

2—AT&M 48" stainless steel suspended, solid baskets, 30 HP motors.
4—AT&M 40" suspended, copper perforated.
8—AT&M 40" copper perforated baskets, bottom discharge Sugar Centrifugals.
1—Fletcher 18" stainless steel, motor driven.
1—Tolhurst 36" stainless steel, motor driven.
1—Sharples ⌀6 Pressurette Centrifuge.
4—Sharples ⌀6 Super Centrifuges, 2 HP.
2—Sharples ⌀16 Vaportite Centrifuges, stainless bowls, 2 HP motors.

MIXERS—ALL TYPES

2—Day ⌀81 Re-Ball 40"x120" stainless steel Sifters or Screeners.
1—Readco stainless 4 gal. Mixer.
1—Baker Perkins bronze 20 gal. Mixer.
2—Baker Perkins 50 gal., sigma blades.
1—Baker Perkins 100 gal. stainless steel clad, steam jacketed double arm Mixer.
1—Baker Perkins 4½ gal. Model BSC, heavy duty double arm jacketed Vacuum Mixer and Condenser.
15—Portable Electric Agitators, ¼ to 2 HP.
8—"Lightnin" top entering Agitators, 3 HP.
1—Robinson 1000-lb. rubber-lined Batch Mixer, stainless steel agitator.
1—1000-lb. steel, steam jacketed Mixer.
25—New and used Powder Mixers, 100 to 4000 pounds.
2—Day 8 and 40 gal. Pony Mixers.

EVAPORATORS—PANS—STILLS

2—Goslin Birmingham Sextuple Effect Evaporators, 58,200 sq. ft. area.
1—Swenson Quad. Effect Evaporator, 60,000 pounds water per hour evaporation.
6—Copper Vacuum Pans 24", 42, 4', 6' dia.
1—Struthers-Wells 12" Steel Column.
1—Complete installation of 1—30"x30' Copper Rectifying Column with 30"x45' Copper Beer Column, Preheater, Dephlegmator, Condensers, Coolers, Instruments.

MISCELLANEOUS

14—Olivite Acid Centrifugals 2" Pumps.
1—Nash ⌀3 Vacuum Pump, 300 cfm.
2—Fuller-Kinyon, 4", 5" Pumps.
2—Pyrex 2"x1½" glass centrifugal Pumps.
1—Lot of Coloron piping, fittings.
1500 ft. 18", 18", 24" Roller Conveyor.
5—Bucket Elevators 25' to 75' centers.
300 ft. 9", 12" Steel Screw Conveyor.

Partial list only—Send for circulars

VISIT US—NOTE OUR NEW ADDRESS

BRILL EQUIPMENT COMPANY

2401 Third Ave. (At 133d St.)
NEW YORK 51, N. Y.

Wagner

"CERTIFIED REBUILT"

A. C. Motors—Immediate Shipment

200 HP	RED	900 RPM	ENCL
125 HP	NEW	1800 RPM	TEPC
100 HP	NEW	1800 RPM	TEPC
100 HP	RED	1200 RPM	EX PRF
75 HP	NEW	1800 RPM	TEPC
60 HP	NEW	1800 RPM	TEPC
60 HP	NEW	1200 RPM	TEPC
60 HP	NEW	900 RPM	TEPC
50 HP	NEW	1800 RPM	TEPC
50 HP	NEW	1200 RPM	TEPC
40 HP	NEW	1200 RPM	TEPC

Also Explosion Proof—20 HP, 15 HP, 10 HP, 7½ HP & Smaller Sizes.

M-G Sets

250 KW DC 120/240 V., AC synch. drive.
200 KW DC 58 v. 3500 amp., AC synch. drive.
165 KW DC 60/70 v. 1500 amp., AC drive.
100 KW DC 120 v. 800 amp., AC drive.
25 KW DC 48 v. 750 amp., AC drive.
20 KW DC 50 v. 400 amp., AC drive.

GEARHEAD MOTORS & SPEED REDUCERS

All sizes & speeds from ⅛ H.P. to 20 H.P.—open, enclosed, expl. proof.

—WIRE OR PHONE YOUR REQUIREMENTS—

ARTHUR WAGNER CO.
1437 W. Randolph St. Chicago 7
ELECTRIC MOTORS - GENERATORS

Hardinge Ball Mills—3'x30"—Pebble Mills 8'x36"—8'x48" with Motors and 4'x16' Porcelain Lined 42"x14' Steel Ball Mill

Westinghouse Turbo Generator 781KVA
No. 1 Simpson Mixer New
Mikro Pulverizers 1—No. 1-SH, and 3-TH with 30 HP Explosion Proof Motor, Rotary Dryer and Kilns 5'x50'—3'x40'
40" Stainless Steel Centrifuge
28" and 40 Tolhurst Centrifuges—Laughlin continuous filter
Jaw Crushers—3x6—10x20—9x15—36x6 Farrell, 24 cu. ft. Day Powder Mixer
Rolls—18x10—20x14—54x20
8' and 10' Gayco Air Separators
2—9'x80' Rotary Kilns
24" Filter Press—3 oye P & F
2 Spencer Turbo Blowers 400 cfm—16 oz.

PEBBLE MILLS

2—6' x 5' silex lined
1—54" x 48" silex lined
1—36" x 42" porcelain lined
1 and 4 gal. Jar Mills

Send For Stock List

LAWLER COMPANY
METUCHEN, N. J.

LOCOMOTIVES

DIESEL: 7, 15, 25, 45 & 65 Ton & 80 Ton.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 30 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 5 Ton, 8 Ton, 12 Ton, 17 Ton, 40 & 70 Ton.

SCREENS

VIBRATING: 3x6, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72 HUMMER, NIAGARA & ROBINS LINK BELT & HURON.
REVOLVING: 4x16, 4x24, 5x30, 5x20, 6x30.

RAILROAD CARS

120—50 Ton Cap. Battleship Gondolas.
90—50 Ton Cap. Flat & 100—Box Cars.
40—30 yd. & 30 yd. Air Dump Cars.
110—6000 & 10000 gal. Tank Cars.

AIR COMPRESSORS

BELTED: 535, 538, 674, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 675, 807, 1302, 1722, 2350 Ft.
DIESEL: 105, 215, 450, 600, 807 & 1090 Ft.
PORTABLE GAS: 110, 160, 220, 310, 540 & 1300.
STEAM: 60, 310, 525, 1300 & 2200 Ft.

JAW CRUSHERS

10x8, 13x7½, 14x7, 15x9, 16x8, 16x10, 18x14, 20x8, 20x6, 20x10, 20x12, 20x11, 25x15, 56x9, 30x6, 30x10, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x70, 10x42 & 12x72.

STEEL TANKS

17—11,000 & 20,000 Gal. Horizontal Storage.
75—R. R. Car Tanks, 8,000 & 10,000 Gal.
14—5000, 10,000, 55,000 & 74,000 BBL. Vertical.

DIESEL UNITS

250 KW Ingersoll Rand 2,60/2300 V.
400 KW Cooper Bessemer 2300 V.
2—375 KVA Worthington 2300 V.

R. C. STANHOPE, Inc.
60 East 42nd St., New York 17, N. Y.

"EMSCO" ENGINEERED EQUIPMENT

means GOOD Used Equipment, Rebuilt and Guaranteed by ENGINEERS-a Sound Investment

PARTIAL LISTINGS ONLY

AGITATOR DRIVES

1—General Electric Vertical Gear Reduction. Output Speed 5 R.P.M.—7½ HP. G.E. totally enclosed Motor—220 volts—3 phase—60 cycle.
1—D. O. James Bevel & Spur Gear Angle Drive Size 102 R.A. Ratio 78.2 to 1. Complete with 15 H.P. totally enclosed fan cooled motor 220 volt—3 phase—60 cycle magnetic switch and push button.
1—Falk Reduction Drive D.A. 1760 rpm. 3.54 HP. ratio 16.8 to 1 with 5 HP. 1760 rpm. 220 volt. 60 cycle. 3 phase motor horizontal, and mounted on cast iron base.
1—10 HP. 3 phase totally enclosed fan cooled vertical motor with Philly Gear reducer having low speed output of 425 RPM.

AIR COMPRESSORS

1—Chicago Pneumatic 8"x8" 90 CFM @ 100# pressure.
1—GE Portable Air Compressor (on wheels) with tank, motor and control.
1—4½"x4½"x7" Vertical Air Compressor.
1—Westinghouse Air Brake cross compound steam operated Air Compressor 150 CFM.
1—Chicago Pneumatic Air compressor 75 CFM @ 100 pounds.

AUTOCLAVES

1—42" dia. x 24'4" Vertical Forge Welded Steel 600 lbs. Pressure—1300 gals.
1—10' x 25' Vertical or Horizontal Forge Welded Steel Jacketed. 100 lbs. Pressure.

BARREL PACKER

1—Motor driven barrel packer, with screw conveyor, trough and hopper.

BLENDER

1—3'6" x 5' Cylindrical Blender with Stands and Drive.

BLOWERS

Large quantity of high and low pressure, high and low capacity blowers and fans in stock.

BOILERS

1—Cope 70 H.P. Vertical Steam Fire Tube Boiler 125#.
1—26" D x 45' long stack for above.
1—Automatic Stoker for above boiler—without motor.
1—Union Iron Works 444 HP Horizontal water tube boiler, 200# W.P.
1—7 HP Keno High Pressure Fire Tube Gas fired Boiler.
1—36" O.D. x 6'10"—30 HP Vertical high pressure boiler with injector.

CENTRIFUGAL

1—38" Suspended King and Gerber with perforated bronze basket.
1—40" Perforated basket—rubber covered, with A. C. motors.

CONDENSERS

1—Alberger Condenser—Size No. H209, 340-¾" copper tubes, 2 pass., C.I. body.
1—42 Condenser 5' diameter x 9' high, 125-¾" tubes, steel body.
1—Condenser 3' diameter x 10' high, 125-¾" tubes, steel body.
1—Elliott Ehrhart Iron Body Surface Condenser—two pass, 245 sq. ft. Surface—⅝" brass tubing & tube sheet.
1—39" x 7' All Copper Condenser with 1¼" tubes —300 sq. ft. surface.
1—Goubert Condenser with 1¼" Brass tubing—iron body 330 sq. ft. surface.
Many others, too numerous to list.

CONVEYORS

Stock of screw, bucket and portable conveyors.

CRUSHERS

1—Eli W. Blake 12" x 9" Eccentric Jaw Crusher. Belt Driven.
1—Gruendler 2 roll smooth crusher 18" x 10½" wide. Pulley drive to jack shaft.
1—Two roll crusher (One roll 22" dia.; one roll 6" dia.)
1—#13 Quaker City Crusher—pulley drive.

FILTER PRESSES

1—Karl Kiefer Clarifying Filter on stand.
1—24" Sperry Filter Press Chassis only. Two eye corner feed.
1—24" x 24" Shriver one eye open delivery Filter Press. Skeleton only.
1—#12 Sweetland Pressure Filter, 36" dia. 36 leaves, provision for additional 36 leaves.
1—24" x 24" Flush type Sperry, one eye, open delivery, flush type and frame filter press (25 plates and frames.)

NEW "DOPP" KETTLES

3—65 gal. Jacketed C.I "Dopp" Kettles 38¼" ID x 18½" deep with hinged steel covers. Tested 200# hydrostatic.

FURNACES

1—Lydon Glass Annealing Furnace with Temperature Controls, Motor, Fan, etc.
1—Dispatch Electric Furnace Type C.F. 17-20 K.W. 220 volt—maximum temperature 1250 degrees F—with circulation fan and ¾ H.P. motor and controls—18 x 12" hearth.

GUMMER

1—Pony Labelrite table model motor driven gummer with single phase motor.

INSTRUMENTS

1—Weston Model 44 Type C. Revolution Indicator 0-1200 RPM.
2—Brown Electric Pyrometers 1200 degrees to 2000 Degrees F.
1—Foxborough Recording Thermometer 0 to 100 degrees F.
1—Tycos straight stem, glass front, separable socket thermometer.

KETTLES

2—50 gallon jacketed agitated open top C. I. kettles.
1—40 gallon jacketed copper kettle on C.I. stand.
1—28" dia. x 14" deep jacketed C.I. kettle with bolted-on C.I. cover.
1—32" dia. x 24" deep C.I. jacketed open top kettle—90 gallons capacity—on legs.
1—8' dia. x 10' deep, iron body with heating coil, agitator and drive, 3000 gal.
1—22" dia. x 22" deep copper, jacketed, lead lined on 3 legged stand.
1—4'6" dia. x 3' deep, steel jacketed, with agitator and drive, 350 gal.
1—19' dia. x 36" deep vertical pressure kettle—rubber lined.
1—6'9" x 4'0" deep iron body, Sulphonator, Propellor Agitator Drive. Tight and Loose Pulley Capacity 2000 gallons.
2—12" dia. x 3' deep, aluminum lined, jacketed agitator, drive, tight and loose pulley.
1—36" D x 4' deep vertical steel kettle.
Stock of jacketed and unjacketed kettles always on hand.

MILL AND PULVERIZERS

1—1 gallon, 2 gallon and 3 gallon laboratory pebble mills.
1—Charlotte stainless steel laboratory colloid mill with 1 hp. A.C. motor.
1—Raymond & 1 Pulverizer with 25 HP motor and 50 HP motor driven fan.
1—21 Gruendler Hammermill with 7½ HP A.C. motor.
1—#13, Quaker City Crusher.
1—6' x 6' Throop Glaze Lined pebble Mill.
1—6' x 9' Porcelain lined pebble mill. T & L pulley drive.
1—Raymond #0 Pulverizer with 25 HP A.C. motor. Raymond 4-0 Pulverizer without motor.
1—Raymond #0000 Pulverizer—belt drives.
1—Raymond #0000 Pulverizer—motor driven, complete with dust collector, separator, cyclones, tubular ducts, steel frame work.
1—3' x 3' Abbe porcelain lined mill body, no doors, stands, bearing or drive.
1—"Briton" Hammermill with blower, screen and 25 HP. A.C. motor.
1—Gruendler 2 roll smooth crusher 18" x 10½" wide. Pulley drive to jack shaft.
1—24" dia. x 20" wide ball mill.
1—6' dia. x 20" deep Muller.
1—12" 30" Kent 3 Roller Mill.
1—18" x 40" Day 3 Roller Mill.
4—Lehmann 5 Roller Water Cooled Mill.

MIXERS

4—20"x40" (12 cu. ft.) single ribbon and paddle mixers complete with drives, fully enclosed A.C. motors and starters.
1—Jacketed Dough Tar Mixer.
1—Sprout Waldron Grain Mixer with 12" Auger spiral.
1—25 Gallon Jacketed single shaft agitated mixer.
1—20 Gallon Tilting Mixer. T & L Pulley drive.
1—J. H. Day Single Blade Mixer 30" W x 30" L.
1—J. H. Day "Hercules" 6 Barrel heavy duty, tilting type mixer with A.C. Motors.

PUMPS

2—250 Blackmer Rotary Pumps 50 GPM with 5 HP AC motors.
1—4½" x 2½" x 4" Worthington Duplex Steam pump.
1—7½" x 4½" x 10" Worthington Duplex Steam Pump.
1—7½" x 5" 6" Worthington Duplex Steam Pump.
1—Wilfley 2" x 1½" 60/80 GPM @ 150' head centrifugal pump with 7½ HP AC motor.
Vacuum pumps, rotary, centrifugal and gear pumps in stock.

REFRIGERATION UNIT

1—American Carbonic Model VS-2 Refrigeration Unit Type CO2—capacity 5 ton.

SCALES

1—500 lb. portable platform scale.
1—100# Fairbanks semi-portable scale.
1—150# Portable platform scale (32" x 40½").
1—10000# Platform scale 8'6".

SEPARATORS

1—Dings High Intensity Magnetic Separator.
1—8 foot dia. Gayco Separator, with motor drive.

STERILIZER

1—Gramhall Deane sterilizer (or disinfector). Inside dimensions 2'6" wide x 4' high x 7' long.

TANKS

From 50 gallons to 7000 gallons in stock. All kinds. Also a quantity of mixing tanks, with agitators. Some with motors, others belt driven. Advise your requirements.

TRUCKS

3—5,000 lb. capacity hand lift trucks.
1—10,000 lb. capacity hand lift truck.
3—Elwell Parker Lift Trucks, Model EG. 4000 lbs. capacity with Edison Storage battery.

VIBRATING SCREENS

1—Jeffrey Traylor Type 4—Vibrating Conveyor Screen.
1—Dolster 3' x 6' Concentrator, Type C, single surface Leahy Heavy Duty Vibrating Screen with 1 HP motor—440 volt—3 phase—60 cycle.

Distributors for **CROCKER-WHEELER ELECTRIC MOTORS AND GENERATORS**

Write for your copy of stock sheet H of available equipment

LIQUIDATION ENGINEERS

EMSCO EQUIPMENT COMPANY

Affiliate of **Emil A. Schroth**

41 HYATT AVE. **PHONE Mitchell 2-3536** **NEWARK 5, N. J.**

SPECIAL OFFERINGS AT SACRIFICE PRICES

FOR IMMEDIATE DELIVERY

UNION Rebuilt Machinery — Established 1912

Mikro 4TH-24", 1-SH and Bantam Pulverizers, Jay Bee, Schutz-O'Neill Mills.

Baker Perkins and Readco Heavy Duty 100-150 gallon Double Arm Jacketed Mixers with Sigma or Fish Tail Blades.

Tolhurst 40" Basket Centrifuge, imperforate bowl with skimming nozzle, retractable plow, and 2 speed motor.

F. J. Stokes, J. H. Day, New Era, Hottman Mixers from 2 gallons to 450 gallons, with and without Jackets, Single and Double Arm Agitators.

Lee Metal 125 & 250 Gal. S. S. Jacketed Kettles.

Lee Metal 50 gal. S. J. Tilting Type Mixing Kettle.

Day & Robinson 100, 600, 1000, 2400, 4000 lbs. Dry Powder Mixers & Sifters.

Robinson #31 and Schutz-O'Neill #3 Gyratory Sifters, Gayco 8' Air Separator.

Kent Three Roll Mill, 16" x 40".

Houchin Aiken and N. E. Soap Mills and H-A Monel-lined Soap Plodder.

Huhn, Wolfe and Ellis Steam and Gas Fired Dryers.

Ross, Lehman and N. E. 3' to 7' Two and One Roll Chasers and Mixers.

Horix Stainless Steel Rotary Filler, Elgin 24 Head Rotary Filler, Bagby Twin Piston Filler with Bottom Feed.

2 Pony Labelrites, Ermold and World Semi-Automatic and Fully Automatic Rotary and Straightaway Labelers.

Knapp #10 Adjustable Can & Bottle Wraparound Labeler.

Pneumatic Scale Automatic Capper.

Stokes and Colton Late Style Rotary Tablet Machines.

Standard Knapp #429 and J. L. Ferguson Carton Sealers.

Stokes & Smith Duplex Auto Powder Fillers.

Shriver Cast Iron 36" and 42" Plate & Frame Wash Type Filter Press.

Sweetland, Vallez, Sperry, Shriver and Johnson Filter Presses.

Package Machinery FA, FA2, Hayssen & Miller Auto Wrapping Machines.

MANY OTHER ITEMS OF INTEREST IN STOCK

TELL US YOUR REQUIREMENTS

UNION STANDARD EQUIPMENT CO.
318-322 LAFAYETTE STREET
NEW YORK 12, N.Y.

TOP OFFERS MADE FOR YOUR SURPLUS EQUIPMENT

FOR SALE

Stainless Steel Tanks, new, 100 and 200 gal. dished bottoms with stands.
20—Steam Jacketed Kettles, Stainless Steel & Aluminum, 30 to 250 gal.
50—Pumps (Steam & Electric) used & new.
1—36" Stainless Klein Filter & Slurry Feeder—new.
1—Stedman 40" Cage Disintegrator.
Stainless Steel Vert. Tank 7' dia. x 10', No. 430 Chrome.
1—Buffovak Impregnating Tank 42" x 52" steam jacketed.
2—Flow-Master Kom-bi-nators.
2—New Ribbon Type Mixers, 8 & 24 cu. ft.
4—Steel Tanks, 100,000 gal. each.
1—Steel Tank, 67,500 gal.
Sterilizers 18 x 18 and 24 x 27 with clamp-down covers & safety valves.
1—Sperry Filter, 18 x 18—24 plate.
1—DeLaval Lab. Separator with ½ H.P. motor.
1—150 gal. Jacketed Glass-Lined Tank with agitator.
6—Stokes Rotary Tablet Machines, Model RD-4.
10—New Sharples Oil Purifiers.
6—New Cleven Can Filling Machines.

SPECIAL
Pumps—2 LeCourtney, 2250 gpm at 90' with 50 H. P. motors & starters —used one day—like new.

H. LOEB & SON
4643 LANCASTER AVE.
PHILADELPHIA 31, PA.

FOR SALE

24"x20" Buffovak Vacuum Drum Dryer.
100 to 300 gal. Stainless Steel Mixing Tanks.
400 gal. Horiz. S.S. Tanks, insul., agit.
400 gal. Vert. S.S. Tank with s.s. coil.
3' to 6' S.S., also Copper Vacuum Pans.
40 gal. S.S. Clad, also Alum. Kettles, jkt.
60 & 150 gal. Copper Jkt. Kettles.
32"x52" & 42"x96" Double Drum Dryers.
50 to 1000 gal. Homogenizers or Viscolizers.
13½" Hermann Filter & Pump.
6 ft. x 20 ft. Steel Tank, 7500 gal.
Nash "Hytor" Vacuum Pump, 5 H.P. Motor.
Kron Susp. Scales, 7500 lbs. with Chain Hoists.
1½" Ing. Rand Centrif. Pumps, 5 & 7½ H.P.
1½" Tri-Clover S.S. Cent. Pumps, ¼ H.P.
New 1 gal. Laboratory Autoclaves.

Send us your inquiries.

LESTER KEHOE MACHINERY CORP.
1 East 42nd Street, New York 17, N. Y.
MUrray Hill 2-4676

KETTLES or REACTORS

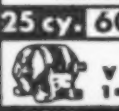
3-7500 gal.

All Steel, welded, dished top and bottom; 10' dia. x 12' 6" deep on straight side; 15' overall height. Made of 5/16" Plate; 6" bottom outlet, 20" dia. manhole—Each Kettle has flat copper coil of 7 turns 3" Pipe and a 3" copper coil 10 turns high. Each kettle is equipped with a Walker Process Equip. Co. Agitator Unit—consisting of 3—24" Bronze Propellers—Driven by Worm Gear Reducer RVD-6—6.43-1 Ratio and directly connected to a 15 HP 3/60/220-440/1750 RPM Motor—still set up as operated. All complete with starting switches, plug cock valves etc., etc. In excellent condition—Only 2 years old.

PRICED FOR PROMPT REMOVAL.

CONSOLIDATED PRODUCTS CO., INC.
P.O. Box 299 *Tel. Waverly 750* Waverly, Iowa

MOTORS • GENERATORS
TRANSFORMERS
25 cy. 60 cy. D.C.



ALL VOLTAGES
1-1500 H.P.
NEW and REBUILT
BOUGHT and SOLD
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

For Sale For Sale

1 Day 150 Gal. Brighton Mixer.
5 Pebble Mills 40 to 500 Gal.
10 Pony Mixers 8, 15, and 40 Gal.
3 Steel Roller Ink and Paint Mills 9" by 24" — 12 by 30"—16 by 40".
3 Day 100 Gal. Imperial Mixers
1 Lancaster Mixer Serial No. 202

SPECIALIZING IN REBUILT MACHINERY

IRVING BARCAN CO.
50 CHURCH STREET
NEW YORK CITY 7, N. Y.
Phone—Cortlandt 7-2195
Plant: 249 Orient Ave., Jersey City, N. J.

FOR SALE

2—6 ft. 3 in. x 120 ft. Rotary Kilns.
2—9 ft. x 160 ft. Allis Chal. Rotary Kilns.
1—6½ ft. x 50 ft. Rotary Cooler.

DARIEN CORP.
60 E. 42nd St., N. Y. 17, N. Y.

FOR SALE

ONE NEW FLOAT SWITCH

Explosion-proof Appelton Electric Co. Cat. No. 13350 SP 820 ships immediately, postpaid.

R. N. JOHNSON
232 E. Madison Ave., Collingswood, N. J.

FOR SALE

530 gal. Type 347 S.S. Tanks, 57"x34".
750 gal. Type 347 S.S. Tanks, 2'9"x17'.
150 sq. ft. Type 430 S.S. Tubular Condensers.
6'x30' Type 347 S.S. Fume Absorption Columns.

FS 7179 Chemical Engineering
230 West 42nd St., New York 18, N. Y.

WONDERFUL
twelve months in the year . . .

GELB
QUALITY & VALUE

1—Vallez Lab. Filter #2E.
1—Shriver plate 7 frame Filter Press, closed delivery, 36" x 36".
1—Shriver Bronze Plate and Frame Filter Press, 18" x 18".
1—Sparkler Stainless Steel 18-S-12 Filter.
2—Shriver Filter Presses, 42" x 42", 46 chambers, hydraulic closing device.
1—Shriver 42" x 42" Filter Press Skeleton.
2—Shriver 24" x 24" recessed type Filter Presses.
2—Johnson 24" x 24" recessed type Filter Presses.

1—Abbe Buhrstone lined Pebble Mill, 6' x 12' with Motor.
1—Kent Jacketed Powder Mixer 800 lb. capacity.
2—J. H. Day Powder Mixers 800 lb. capacity.
2—Louisville Rotary Steam Tube Dryers, 6' x 50.
1—Louisville Rotary Steam Tube Dryer, 54" x 30'.
1—#2 Royle Extruder.
1—#1 Royle Plastic Extruder.
1—Ball & Jewell Rotary Cutter #½ with 5 HP Motor.
1—Ball & Jewell Rotary Cutter #½.
3—Munson #0 Rotary Cutters.
3—Buffalo Drum Dryers, 5' x 12'.
2—Buffalo Vacuum Drum Dryers, 5'10" x 10'.
1—Buffalo Double-door Vacuum Shelf Dryer, 15 shelves.
1—Buffalo Double-door Vacuum Shelf Dryer, 12 shelves.
1—Buffalo Single-door Vacuum Shelf Dryer, 17 shelves.
1—Stokes Vacuum Dryer, 4' x 10'.
2—Stainless Steel Hersey Rotary Dryers, 30" x 16', 36" x 16'.
1—B & S Double Drum Atmospheric Dryer 3' x 6'.
1—Bartlett & Snow Direct Heat Dryer, Brick-lined 8½ x 50'.
1—Ruggles Cole Rotary Direct Heat Dryer 7½ x 60'.
1—Stainless Steel Storage Tank, 4' x 5'.
1—Stainless Steel Storage Tank, 6,000 gallons.
1—Pfaudler Glass-lined Kettle 220 gallons.
1—Struthers Wells Jacketed Kettles 120 gallons.
1—Duriron Kettle, 430 gallons.
3—Jacketed Kettles 1100 gallons 5½' x 5½'.
1—200 gallon jacketed kettle with agitator.
1—Patterson Jacketed Kettle 600 gallons, with agitator.
1—Jacketed Kettle 300 gallons with agitator.
1—400 gallon jacketed kettle.
1—10 gallon lead lined jacketed kettle.
15—Sharples Super Pressurite Centrifuges with 3 HP Explosion Proof Motors.
1—Kent Pony Mixer, 30 gallons.
1—J. H. Day Powder Mixer, 400 lbs.
3—Ross Pony Mixers, 45 gallons.
1—Ross Powder Mixer, 2,000 lbs.
5—Simpson #0 Intensive Mixers (New)
1—Sperry Skeleton 30" x 30".
1—Fitzpatrick Comminuting Machine, Model D

The Gelb Girl, January 1949

2—Pfaudler Stainless Steel Jacketed Tanks, 13,500 gallons.
1—2200 Gallon jacketed kettle with agitator.
6—Storage Tanks from 8,000 to 61,000 gallons.
1—Stainless Steel Jacketed Kettle 220 gallons.
5—Monel Storage Tanks, 1,800 gallons.
1—Nickel lined, jacketed kettle, 4000 gallons.
1—10,000 gallon Storage Tank 1" shell.
1—Blaw Knox Jacketed Agitated Autoclave 3' x 4'2".

1—Shriver Plate & Frame Filter Press, 7" x 7".
1—Shriver Lead Plate & Frame Filter Press, 7" x 7".
1—Johnson Plate & Frame Filter Press, 36" x 36".
1—Sperry 18" x 18" Filter Press, 14 chambers.
1—Abbe Pebble Mill, 3' x 4'.
1—Crossley Porcelain lined Pebble Mill, 100 gallons.
1—Vallez #2B Filter.
1—Vallez #2B Filter, glass leaves.
1—Vallez #2B Filter, Aluminum leaves.
1—Vallez #2B Filter, Rubber covered leaves.
1—Vallez #2B Filter, Copper Leaves.
3—Hardinge Conical Ball Mills, 8' x 30", 5' x 24", 6' x 22".
2—Thropp 2-roll Rubber Mills, 16" x 42".
1—Farrell 2-roll Rubber Mill, 36".
1—Thropp 2 roll Rubber Mill, 30'.
2—Smidth Iron Lined Tube Mills, 4' x 12'.
1—Abbe Tube Mill, 4½' x 15'.
1—Abbe Silex-lined Pebble Mill #3½.
1—Abbe Silex-lined Pebble Mill, 8 gallons.
1—Patterson Porox-lined Pebble Mill, 48" dia. x 24".
1—Allis-Chalmers Ball Mill, 5'8" O. D. x 18", Silex lined.
15—Lummus and Struthers Wells Condensers 110' to 760 sq. ft.
1—Kewanee 125 HP Boiler, 125 lbs. pressure.
3—LaBour Stainless Steel Centrifugal Pumps #10, #20, and #25.

Established 1914

R. GELB & SONS, Inc.,

CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY

STATE HIGHWAY No. 29, UNION, N. J. • UNionville 2-4900

GOOD USED PROCESSING EQUIPMENT

6—Andersen No. 1 Expellers, Cookers & Dryers.
2—Dopp Closed Agit. Jack. Kettles, one Doppiay Acid Resistant.
1—Baker Perkins 200 gal. Double Arm Jack. Mixer.
1—LEHMAN 4 Roll W-C 13"x36" Steel Mill 20 HP. Motor.
1—Hardinge Conical Ball Mill 41½"x24"
1—Devine Vac. Shelf Dryer, 9 Shelves 42" Sq.
2—Devine #3 Vac. 4 Shelf Dryers, Elec. Heated.
1—Buffalo Vac. Drum Dryer, 24"x28".
1—Badger 42" dia. Monel Bubble Cap Columns.
4—Albright-Nell 4'x9' Atmos. Drum Dryers & Flakers.
6—Pony or Paste Mixers, 8, 15 & 40 gals.
3—Lehman 6 Ross 3 Roll Mills, 3"x9", 9"x32", 12"x30" & 18"x48".
2—Abbe & Leominster Rotary Cutters 5 HP. Motor.
3—Houchin 18"x30". 4 Roll Granite Stone Mills.
6—Farrel & Thropp Rubber Mills 20", 36", 40", 48", 60" & 84".
2—Rubber Calenders, 20", 54" & 60".
3—Rubber Tubers & Extruders, 2½" to 6" & Banbury Mixers.
5—Tyler 3S Jr. Hummer Screens 24"x60".
1—Sprout Waldron 40" x 84" Single Deck Sifter, Motor Driven.
2—Orville Simpson 30" x 40"—40" x 80" Rotex Sifters.
1—500 gal. Closed Jack. Steel Kettle or Still.
1—Devine 600 gal. Steel Kettle.
1—Devine 1000 gal. closed Steel Kettle.
1—250 gal. Lead Lined Kettle.
3—Shriver 18" x 24" sq. Wood Plate & Frame Filter Presses.
13—Sperry & Shriver 18", 24", 30", 32" & 42" Filter Presses.
2—Sperry 19" Lead & 2 Shriver 18" & 24" Wood Filter Presses.
36—Frames & 35 Plates for Sperry closed del. Iron Filter Press.
4—Baker Perkins heavy duty Jack. Mixers, 200, 100, 50, 9 & 7 gal.
10—Tolhurst 40" Suspended Type Centrifugals Bottom Discharge.
1—Tolhurst 24" Rubber Lined Centrifugal. Other sizes 30" to 48".
11—Sharples #5A Stainless Steel Oil Centrifuges, 2 HP, latest type.
1—Sharples No. 6 Centrifuge, 2 HP.
4—Stokes RD 4, 1-9/16" Rotary Tablet Machines, also ¼", 1" & 1¼", also single punch.
1—Stokes #200 Automatic Molding Press.
Injection Molding Machines, 2 oz. to 10 oz.
1—Huber Type 25 Ton Pure Block Press.
2—Manton-Gaulin Stainless Steel Homogenizers.
1—Sturtevant #9 Swing Hammer Mill.
10—Day Dry Mixers 50, 100, 500, 600, 1000 & 2500 lbs.
6—Atmospheric Dryers or Ovens, Gas Fired.
1—Royle #2 Perforated Extruder.
3—Durieux 3"x2" Centrifugal Pumps.
1—Burkhard 36" Copper Revolving Pan.
6—Filling, Labeling, Cartoning & Wrapping Machines.
4—Stokes & Day Powder Filling Machines.
2—Abbe #15 Blutergess Turbine Sifters.
1—Colton Hand Operated Tube & Jar Filler.
1—Standard Automatic Semco Jr. Vac. Bottle Filler.
10—New Stainless Steel Tanks, 100 to 3000 gals. open & closed.
12—Alum. Jacketed Kettles, 30 to 100 gals.
10—Stainless Steel Jack. Kettles, New & Used, 30 to 500 gals.
13—Copper Jack. Kettles, 2, 20, 50, 75, 100, 250 & 350 gals.
6—Plaudler Glass Lined, Jack. Agitated Kettles, 350, 400 & 500 gals.
5—Mikro Pulverizers, Lab. to 60 HP.
15—New Portable Electric Agitators, ¼ to 2 HP.
3—Abbe Eng. Pebble Mills 24" x 30", 24" x 36", 34" x 48" & 6' x 8'
6—Abbe Jar Mills, Single & Double, 1 & 2 gals.
1—Williams #3 "Regular" Type Hammer Mill.
6—Hammer Mills 1 HP to 50 HP.
1—Stedman 32" Model A Spike Crusher.
Sturtevant 36" Rock Emery Mill & Robinson #10 Saw Tooth Crusher.
3—#5000 & #0 Raymond Mills.
1—Blystone 3000 lbs. Jack. Horiz. Spiral & Paddle Type Steel Mixer.
1—Faust 150 gal. Jack. Spiral Steel Mixer.
2—DeLaval Multiple Clarifiers, #200 & #301, Motor Driven.
1—Sprout Waldron 16" S.S. Attrition Mill, two 7½ HP motors.
6—Attrition Mills & Disc Grinders.
3—Worthington 12"x12"x12" Vacuum Pumps.
4—Stokes Vert. High Vac. Pumps.
4—Day Pot Mills 24"x32" dia.
6—Lood & Paste Mixers up to 300 gals.
3—Varnish Kettles 150 & 200 gals.
1—Schutz O'Neil 20" Pulverizer; also #1 Pulverizer.
2—Double Roll Crushers, 10"D. x 14"T.
20—Rotary, Centrif. & Triplex Pumps.
New Portable Agitators ¼ to 5 HP.
4—Gas Boilers, up to 10 HP.
Hydraulic Presses, Pumps & Accumulators.
Soap Machinery for Toilet, Laundry, Chip, Liquid, etc.

Partial Listing WE BUY YOUR SURPLUS MACHINERY *Write for Bulletin*

STEIN EQUIPMENT CO.

90 WEST ST. NEW YORK, 6, N. Y.
Phone: WORTH 2-5745 *Cable:* MACHEQUIP

WE SELL MEC WE BUY

FOR SALE
PARTIAL LIST ONLY

4—Suspended Style Centrifuges 48" Stainless Steel Solid & Perforated Baskets.
1—Oliver Vac. Filter (New) 5'-4" x 8'.
3—Stainless Steel Condensers 150 sq. ft.
2—Glass Lined Jacketed Closed Kettles 200 and 250 gals. Perfect linings.
1—Pfaudler 1500 gal, Closed Glass Lined Pressure Kettle.
1—Buflovak Nickel Coated Reactor 200 gallons.
2—Vacuum Shelf Dryers 17 Shelf 40" x 43".
3—Vacuum Drum Dryers 24" x 20" and 5' x 12'.
5—Febble Mills Pore. & Silex Lined 5 to 1000 gals.
4—Day & Robs 20 and 40 gallon Pony Mixers.
1—Day Imperial Jack. Mixer 50 gal.
1—Kelly No. 230 Filter Press.
1—New 25,000 gallon Rubber Lined Tank.
Agitators, Mixers, Labelers, Filters, Stainless Steel Tanks & Kettles, Boiler & Belt Conveyors, etc.

Send for Bulletin A-22.

THE MACHINERY & EQUIPMENT CORP.
533 W. BROADWAY NEW YORK 12, N. Y. TELEPHONE GRAMERCY 5-6600

COMPRESSORS
VACUUM PUMPS
Latest Types
Rebuilt by American
Tested and Guaranteed

COMPRESSORS—STATIONARY:

60 CFM 150# 6x7 Ingersoll ES-1
106 CFM 300# 7/8x7 Chicago YCB
191 CFM 350# 9/4x9 Ingersoll ES2
191 CFM 250# 9/4x9 Ingersoll FS2
242 CFM 75# 9-10x9 Ingersoll FS-1
262 CFM 75# 10x9 Ingersoll ES-1
488 CFM 110# 11½/7x7 Chicago Y-CM
1302 CFM 125# 20/12x14 Chicago O-CE
1452 CFM 70# 15/15x14 Penn DB-1
Many other makes and sizes available—List 147

VACUUM PUMPS:

1080 CFM 22x8 Ingersoll ER-1
1183 CFM 22x9 Ingersoll ES-1
250 CFM 12x6 Worthington
1183 CFM 9-22x9 Ingersoll FS-1
See them rebuilt and Tested at our Plant

PORTABLE COMPRESSORS:

60 CFM Chicago (Gas) 2 Pneu
105 CFM Worthington (Gas and Diesel) 2 & 4 Pneu
160 CFM Worthington (Gas) 4 Pneu
210 CFM Worthington (Gas and Diesel) 4 Pneu
315 CFM Worthington (Gas and Diesel) 4 Pneu
500 CFM Wthington (Diesel) 4 Pneu

Sale - Rent - Rental Purchase

You can always buy a new American AF 1 (Bulletin 1000)

AMERICAN AIR COMPRESSOR CORP.
North Bergen, N. J.
Telephone: N. J. Union 5-4848
N. Y. Chickering 4-7665

FOR SALE

TEXTOLITE TUBING

For use as Chemical Conduit. Light in weight, structurally strong and chemically inert. Resists the effects of corrosive waters, atmospheres, chemical salts and solutions, solvents, gasolines, oils, greases and other petroleum products. A paper base phenolic laminate manufactured for the Government by General Electric, and now Surplus. Has not been subjected to use. 5" O.D. 4½" I.D. ¼" wall. Length of sections 9' 6". Will withstand in excess of 500 p.s.i. Offered at a low fraction of original cost. Prices, specifications and sample of material on request.

FS-7875, Chemical Engineering
330 West 42nd Street, New York 18, N. Y.

FOR SALE

VILTERS AMMONIA COMPRESSOR

SIZE 8½" x 8½", ABSOLUTELY NEW, ORIGINAL CRATE. IMMEDIATE DELIVERY FROM PHILADELPHIA. PRICE FAVORABLE.

FS-7121, Chemical Engineering,
330 West 42nd Street, New York 18, N. Y.

FOR SALE

Used Equipment — Ball Mill

One 4' x 4' Allis Chalmers ball granulator complete with motor drive and coupling (no motor). Has been used approximately 8 months since time of purchase. *For full particulars write or phone: E. T. McGrath,*

Pittsburgh Metallurgical Co., Inc.
P.O. Box 636, Phone 5252, Niagara Falls, N. Y.

FOR SALE

BOILER

565 HP Water Tube Boiler, Springfield, 160 lbs. pressure, 5650 sq. ft. heating surface, 3 Fireite stokers, Forced draft fan, Boiler feed pump, Coal elevator and bunker, ashbunker.

CHICAGO ELECTRIC CO.
1312 W. Cermak Rd. Chicago 8, Ill.

FOR SALE

2 steel rotary sulphur burners, Glen Falls model, four foot diameter by ten feet long with drive, worm feeders, etc.

For inspection appointment call S. T. Dvorak

GELB & CO.
Contractors
DuPONT GRASSELLI PLANT
3500 Grays Ferry Ave.
Philadelphia, Pa. Phone Howard 5-2750

2—FLUOR WATER COOLING TOWERS 1500 GPM
1—WALLACE & TIERNAN CHLORINATOR 60#—24 HOURS
1—GAS DRYING PLANT 1,000,000 CU. FT. PER HOUR
1—G.E. NITROGEN PLANT, PRODUCT 23,000 CU. FT. HR.—99.5% N.
1—GIRDLER HYDROGEN PLANT, PRODUCT 12,000 CU. FT. MIN. 97% H2 WATER GAS PROCESS
1—100,000 CU. FT. GAS HOLDER
5—FULLER V300-300 VACUUM PUMPS 1886 CFM—29.9" VACUUM

R. C. STANHOPE, INC.
60 E. 42nd St. New York 17, N. Y.

BOILERS

10 to 1000 H. P.
NEW-USED RECONDITIONED
Steam, Gas and Electric Power Equipment
J. PARKER THOMPSON CO., INC.
507 FIFTH AVE., NEW YORK CITY
MURRAY HILL 7-6547-8-9

FOR SALE

Reactor: 200 gal. Pfaudler jack., ss.
Crystallizers: 2—6' Buffalo Vacuum.
Drum Dryer: 4x6' Stokes atmospheric.
Mixers: Day 80 gal. Brighton.
Vacuum Mixer: W. & P. 20 gallon.
Powder Mixers: 500, 1000, 1500, 2000 lbs.
Pebble Mills: 6x5', 5x4', 4x5', 18x24".
Oil Expeller: Anderson RB.
Hammer Mill: Raymond 16", 7½ hp.
Copper Still: 100 gal. steam jacketed.
Powder Fillers: Stokes & Smith, Triangle.
Liquid Fillers: Siphon and Vacuum types.
Tablet Machines: Colton #4 and #5.
Kettles: Stainless Steel—all sizes. (New).
Dryers: 6' x 30' hot air rotary.
Filter Presses: 24" cast iron, 24" wood.

WE BUY — WE SELL — WE LIST

LOEB EQUIPMENT SUPPLY CO.
1927 W. North Ave. Chicago 22, Ill.

FOR SALE

TANKS

8—24' d x 20' high vertical tanks, ⅛" plate, ½" first ring, 7/16" second ring, ⅜" third ring, ⅜" roof, firebox quality steel. 67,000 gallons.

2—34'6" x 35' tanks, ⅜" plate, top ring ¼", ¼" roof, used for the storage of toulene. 280,000 gallons capacity.

ROGERS & WRIGHT, INC.
710 PEOPLES BUILDING
CHARLESTON, WEST VIRGINIA
(PHONE 30-171)

FIRST FACTS
in the Processing Industries

1 Brand New Girdler Votator in stainless; 2 cylinder, 4".
1 A.T.&M. 40" Stainless Centrifugal Imperforate basket, bottom discharge; 40 HP motor.
3 Monel and Stainless 30" Stainless Centrifugal Extractors.
1 Bird 48" Solid Bowl Steel Centrifugal, suspended type plow and solid bottom discharge.
1 Bird Continuous Centrifugal Filter, 36" x 50".

IT'S TIME for INVENTORY

Check not only your product stock but also your equipment. Does your plant need modernization . . . condensation . . . enlargement? FMC has been useful to thousands of firms in this regard. Can we help you too?

1 New Triple Effect Long Tube Copper Evaporator, 3,100 sq. ft. Total number of tubes 336.
1 Buffalo Stainless Extractor, single effect, 7'13', 900 sq. ft. forced circulation, ext. calandria type.
4 Pfaudler Glass Lined Vacuum Kettles, 500 gal., 2,500 gal. Jktd. or Unjktd. with agitators.
1 Stainless 550 gal. Jacketed and agitated Reactor with Reflux and Tubular Condenser.
15 Autoclaves and Reactors in Cast Iron, Steel, Stainless some with agitators and jackets.
3 Dopp 200 gal. Jacketed Kettles.
1 Dopplay 700 Gal. Jacketed and Agitated Pressure Kettle.
1 Aluminum 1300 gal. Jacketed and agitated Still.
50 Shriver and Sperry Filter Presses, all sizes.
Sweetland Filters, Nos. 5, 7, 10 and 12.
12 Oliver, Feinc, Kelly Filters from Lab. size to 11'6" x 18'; specifications on request.
4 Louisville Dewatering Presses, Model 3A.
30 Colloid Mills, Homogenizers, Viscolizers by Premier, Eppenbach, Manton Gaulin, Marco Flowmaster, Cherry Burrell, Union, Charlotte from ½ HP up to 50 HP.
25 Hammermills and Grinders by Williams, Jeffrey, Gruendler, Stedman, Raymond, Mikro, others.
3 Devine Vacuum Shelf Dryers, No. 11—40" x 43"
3 Tubular Condensers for above available if desired.
8 Single and Double Drum Atmospheric Dryers, from 2' x 3' to 5' x 12'.
2 Bartlett & Snow Stainless Vac. Pan Dryers: 7'10" x 2'11".
1 Buflovak Nickel Rotary Vac. Dryer, 5' x 30'.
2 Struthers Wells Stainless Atmospheric Drum Dryers, 3' x 4' and 5' x 10'.
4 Apron Type conveyor Dryers by Procter & Schwartz, Sargent others; up to 72'; single and multiple.
6 Truck and Tray Dryers, steam or electrically heated several sizes.
4 Louisville Steam Tube Dryers: 3' x 20'; 4'6" x 25'; 6' x 25' and 5'6" x 30'.
2 Huhn Steam Tube Dryers; 24" x 11'6" and 30" x 10'.
5 Hess and Hersey Dryers up to 23'.
8 Good and Swenson, Devine and Buffalo single, double and triple effect Evaporators in copper tinned, cast iron with heresite lining and steel accessories included.
4 Mikro Pulverizers, Bantom to No. 4's with motors.
15 Fitzpatrick Comminutors, Model D, in stainless.

6 Tube and Rod Mills up to 21'.
5 Continuous Ball Mills, 3' x 3' up to Hardinge Conical Mill, 8' x 30".
7 Pebble and Ball Mills, 24" x 30", 36" x 36", 36" x 48", 6' x 5' and 6' x 8'.
10 Roller Mills Lab. size to 16" x 40", standard makes.
3 Lancaster Type EBG4 Counter Current Stainless Batch Mixers.
2 Spencer Turbo Compressors in Stainless 1875 CFM.
1 Readco Stainless Double Arm Mixer, 142 Gal. with 20 HP motor.
50 Heavy Duty Horizontal Jktd. Mixers, with double arms, sigma or naben; geared both ends, tilting; 100 gals. working.
3 Baker-Perkins Jacketed Mixers, 10 gal., 50 gal., and 75 gal.
8 New and Rebuilt Tumbling Type Dry Mixers by Patterson, MacLellan, Gemco and others; all sizes.
10 J. H. Day Ro-Ball Sifters No. 82, two separations, screen size 40" x 120", with 3 HP motors.
6 Tyler Hummer Screens, multiple separations, state size and type.
40 Tablet Machines and Preforming Presses by Stokes, Colton and Kux up to 50 ton; state requirements; single punch and rotary models.
14 Rubber Mills by Farrel-Birmingham, Thropp, Erie and others from 24" to 84" some with motors and accessories.
4 Royle and National Extruders up to No. 4.

Large Stock of Packaging Equipment including:

Dry Powder Fillers by Stokes & Smith, Triangle, Pneumatic, Carter, Whiz, semi and fully automatic.
Labelling equipment by World, Ermold, Pneumatic, Standard Knapp, Burt—for all types of containers.
Automatic Gluers, Sealers, cartoners, wrappers, etc.
Liquid Fillers of every type; tube and jar Fillers, Closers in all standard makes.

COMPLETE PLANTS *For Sale:*

ready to operate; for
Rubber and Plastics
Brake Lining
Soaps-Detergents
Chemicals & Acids
Oil Extraction
Brewery-Distillery
Shoe Polishes
Vegetables-Fruits
Preserves-Juices
Latex Dipping

Send for Special Bulletin of Industry Listed above.

Nobody pays more than FMC for Good Used Equipment

FIRST MACHINERY CORP.
157 HUDSON ST. WOrth 4-5900 NEW YORK 13, N. Y.

"hp" FOR QUALITY EQUIPMENT

STEEL STORAGE BINS—HOPPER TYPE—1—66' long, 16' wide, 10'6" high straight side, 6'-6" height of hopper, 6 compartments.
1—11' long, 8'-9" wide, 10" high straight side, 6'-6" height of hopper, 2 compartments.
1—88' long, 12' wide, 7' high straight side, 6' height of hopper, 8 compartments.
3—34' long, 12' wide, 6'-6" high straight side, 9' height of hopper, 4 compartments.
1—22' long, 11'-6" wide, 7'-3" high straight side, 6'-3" height of hopper, 4 compartments.

STACKS—3—5'3" dia. x 110' high, 3/8" and 5/16" plate, reinforcing bands every 10'8". 92—30" diameter x 30' high.

MULTIPLE HEARTH FURNACES—2—Continuous gas fired, air cooled. Mfg. by Allis Chalmers. 24'-7" dia. x 33' high. Complete with mixers, heater unit, base and power drives. (1 Never Used—1 Slightly Used).

ABSORBER TANKS—2—22' dia. x 90' high, welded construction. 5/16" and 3/8" shell. Sloping bottom 2' to 4'9" from base of shell. Cap. 260,000 gals.

STORAGE TANKS—2—Vert. 12'-6" dia. x 45' high, 5/16" and 1/2" plate, welded.

CENTRIFUGAL PUMP—Frederick Iron & Steel Co. 8" DSV-SM, 2500 GPM, 150' Head, complete with 125 HP TEFC Motor and Control Panel.

VACUUM PUMPS—2—Stokes Machine Co. Hi-Vacuum Pumps Model #212-C. Single stage rotary, 100 cu. ft. V-Belt drive.

JEFFREY SWING HAMMER PULVERIZER—36" x 24", Type A-2, with 50 HP TEFC Motor.

SCRUBBER TOWER—16'x39'x3/8" shell and dome, 1/2" bottom.

THYLOX LIQUID PURIFICATION PLANT—Capacity 60 million cu. ft. per 20 hours.

GAS PURIFICATION SYSTEM—Complete with tanks, valves, piping. Capacity 2000 to 16,000 cu. ft. per hour.

FULLER-KINYON SYSTEM—Type H5 Pump with Motor and Feed Hopper, hi-low system, 250' 4" pipe and 8—3 way motorized valves.

CHRYSLER AIRTEMP—2—NEW 75 ton units complete with Trane Evaporative Condensers, Fans and Motors.

SWEETLAND FILTER—#12, 72 leaves, 2" spacing, 37" diameter, 145" long, 1000 sq. ft. filter area.

CELORON FILTER—30", 4-eye, washing type, 52 chambers, 60# pressure.

SHRIVER RUBBER COVERED—2 UNUSED Filter Presses 24", closed delivery, 4-eye, 3.61 cu. ft. capacity, manual closing.

OLIVER CONTINUOUS FILTER—5' 4" dia., 6' face, serial #8823, complete with all accessories.

AIR COMPRESSORS—8—C.P. 12"x10" NSB, 266 CFM, 100# pressure.

AUTOCLAVE—Vertical, jacketed, stainless steel lined, 6'0"x7' 11 7/8"x11/16" shell, 40# W.P., ASME U-69.

BELT CONVEYORS—1—30" 65' centers, stainless steel Belt with reducer and 5 HP, TEFC Motor.
1—Barber Greene Co. 24", 18' center, troughing type. All mounted on wheels, operating on 30# rail supported by structural steel. Drive 3 Hp 3/60/220/440, 1200 RPM motor.

Heat and Power Co., inc.
70 PINE STREET — DIGBY 8-0373 — NEW YORK 5, N. Y.

A New Year • A New Name

MAHONEY FOR MACHINERY

NEW—USED—REBUILT

A NEW HIGH IN PERSONAL SERVICE

"Machinery Shopping" for the Busy Plant Executive. We locate equipment you need or buyer for your surplus. "Finder's Fee" Basis.

PROCESSING - PACKAGING MATERIALS HANDLING

982 Stuyvesant Ave. Union, N. J.

6' x 48" HARDINGE BALL MILL
WITH OR WITHOUR AIR SEPARATION

#11½ Sturtevant Ring Roll Mill.
54" x 30' Rotary Dryer.
3 Ft. x 5 Ft. Hummer 3 Deck Screen.
24 In. x 40 In. Link Belt Apron Feeder.
4½ Ft. x 30 Ft. Refractory Lined Rotary Kiln.
36 In. x 24 In. Traylor Jaw Crusher.
70 In. x 35 Ft. Ruggles Coles XB Indirect Dryer.
8 Ft. & 10 Ft. Gayro Air Separators.
1—40 x 48 & 1—42 x 54 Buchanan Jaw Crushers.
45 Ton Plymouth Diesel Locomotive.
4 Ft. x 20 Ft. Brass Lined Rotary Dryer.

DARIEN CORP.
60 E. 42nd St. New York 17, N. Y.

FOR SALE

Abbe Brick Lined Pebble Mill 4' x 21'
Sturtevant 09" Hammer Mill
Buffalo 12" x 24" Hammer Mill
Carl Kiefer 10"—12 plate Filter Press
Steel Tanks 4000 to 16000 Gals.
Some H.P. Tanks
Kettles of various sizes

LOWELL TANK & MACHINERY CO.
567 Middlesex St. Lowell, Mass.

SSS BARGAINS SSS

1 Raymond #00 Automatic Pulverizer complete with Air Separator, Cyclone Dust Collector, Tubular Cloth Dust Collector, 30 HP motor, and switches. Used very little. Only $1500.00.

8 Wood tanks. Heart Cypress, approx. 7 x 10 ft. inside, 2½ in. staves, 3 in. bottom. Excellent condition, but without hoops. Price: $125.00 each or $800.00 for the lot.

P. O. Box 163
Knoxville, Tennessee

For Sale, Subject to being Unsold:

2—Copper Vertical Storage Tank ⅛" thick metal, approximately 7 ft. high and 2 ft. in diameter, 13" x 15" opening on top, gauge cock on side. Capacity 2050 gal. and 2095 gal.
2—Copper steam jacketed kettles, 700 lbs. and 900 lbs. wax capacity with bottom outlets.
2—3 roll soap chipping machine, rolls approximately 14" in diameter by 60" long.
6—Open top steel storage tanks with bottom outlets. 600 gal. capacity each.
5—2000 gal. steel mixing tanks, jacketed for hot water but not steam tight.
2—Butter churns 44" x 62½" with two speed drive and double beater paddles.
1—6" B. F. Sturtevant Blower.
1—45" Universal I.L.G. Ventilating Fan, 50" high and 18" wide.
1—Horizontal Steel Storage Tank 45" in diameter x 71" long.
1—Steel Oblong Steam Jacketed Tank, 120" long x 53" wide x 50" deep.
1—Complete Small Asphalt Emulsion Plant.
1—Complete Hot Asphalt Cloth Saturating Plant.
1—10 H.P. Vertical Steam Engine.
1—3" Rotary Pump.
2—10 H.P. Vertical Steam Engine.
1—15 H.P. Vertical Steam Engine.
1—7½ H.P. Vertical Steam Engine.
1—Cox Air Compressor, 500 cu. ft. per minute.
1—75 cu. ft. Locomotive type compressor.
2—150 H.P. Return Tubular Boilers.
3—Ross Stone Paint Mills.

Apply Cochrane Chemical Company, 151 Main Street, Matawan, New Jersey. Telephone Matawan 1-2400.

EQUIPMENT FOR IMMEDIATE SALE

CHRISTIE TYPE RV ROTARY RETORT. Constructed of Nickelclad and 17 Chrome steel plates, 3 ft. diam. x 30 ft. long, complete with varispeed drive, draft fan, vapor fan, variable speed screw feeder, oil burner, brick work and refractory linings for casing and motors. New, only used several days on tests.

PORTABLE SUPERHEATER. Foster Wheeler, size 72, steam pipe 4", smoke pipe 10" arranged for oil firing. New, only tested.

HERSEY ALL MONEL HOT AIR DRYER, 3 ft. diam., 26 ft. long, complete with variable speed feeder and transmission, fan, heater and motor. A1 condition.

Airmail inquiries to:

CIA. DE PRODUCTOS QUIMICOS
P.O. Box 13 Havana, Cuba

FOR SALE

30" Centrifugal

Rochester, suspended, bottom discharge, perforate basket unit. Basket wall pure nickel with monel bottom and monel reinforcing rings. Casing nickel plated. Complete with 2 speed (1200 600 rpm) 5 HP explosion-proof motor and control. Priced at 50 percent of the new cost.

BUCKMAN LABORATORIES, INC.
Memphis, Tennessee

NAVY SURPLUS

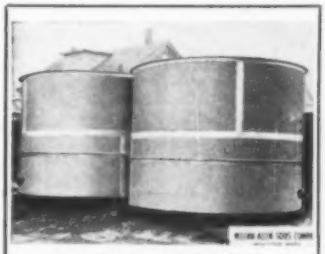
COMMERCIAL THERMOMETERS

—20° to 130° F.

Rare buy on precision-made thermometers, mercury-filled. Over-all length 10½ inches; calibrated in degrees, numbered every ten degrees. Glass nub at top for recess-mounting. Opaque back and large numerals facilitate reading. Sturdy, accurate construction met high Navy standards. Quantities limited. Order at once from Dept. 121-A—Cash, check or money orders. No C.O.D.'s.

MILTON HAMMER & ASSOCIATES
Bond Building
Washington 5, D.C.

$1 Postpaid



FOR SALE
Immediate Delivery

Two 6700 gallon Stainless Steel Storage Tanks
11'-6" diameter by 8'-8" high
¼" thick Type 304 Stainless Steel shell and flat head
2-6" flange nozzles in shell
4" and 6" couplings in bottom

Subject to prior sale

WILLIAM ALLEN SON'S CO.
Worcester, Mass. Tel. 5-8666

WELDED TANKS ⅜ INCH SHELL

3— 9000 Gal. 8'9" x 20'4" Long
1—10,000 Gal. 8'9" x 23'4" Long
3—13,000 Gal. 10'9" x 19'9" Long
1—16,000 Gal. 10'9" x 23'9" Long

LESTAN CORP., ROSEMONT, PA.

FOR SALE

AGITATORS
10—Side Ent. Stainless—6" to 18" blades
1—"Lightrun" Side Ent.—10 HP
2—Vertical ½ HP Expl. Pr. 1725 RPM
1—Turbo #4B Vert. 30 HP, 571½ RPM
12—Portable, ¼ to 1 HP, 400 RPM, Expl.
28—Portable, ¼ to 1 HP, 1725 RPM, Expl.

AUTOCLAVES
1—Steel, 180 gal. Jktd & Agit.
1—Iron, 130 gal. Jktd.
1—Aluminum, 100 gal, Jktd & Agit.

BLOWERS — COMPRESSORS
2—Ing. Rand Blowers 4000 CFM @ 3#
1—Ammonia Compr. 3" x 2", 3 HP
2—Brunswick Kr. Co. Compr. size H-9B
1—Ing. Rand Air Compr. 6 x 5, 10 HP
2—Air Compr. 780 CFM @ 100#, 125 HP

CENTRIFUGES - CENTRIFUGALS
2—DeLaval # 600 Separators
1—Sharples Super Centrifuge #18V
1—AT&M Co. Susp. 40" Stainless Imperf. Basket—NEW
3—Basket 20"—48", Bot. Drive

CONDENSERS - EXCHANGERS
10—B & G Steel Tub. 311½ sq. ft.
8—All copper Tub. to 281 sq. ft.
2—Stainless Tub. 315 sq. ft.
9—Double Pipe Coolers or Exth.
1—Brine Cooler—400" coil

DRYERS
3—Double Drum Atm: 22" x 38"
3—Aotary Vac: 5' x 30', 7'6" x 20'
2—Rotary Steam Tube: 5'6" x 30', 6' x 25'
2—Vac. Tray: 100 & 345 sq. ft.
1—P & S Atm. Tray—1030 sq. ft.
3—Pan (Grainers)—5' x 30"; 5'6" x 36"
10—Rotary Hot Air: 2' x 12'; 4' x 30'; 4'6" x 12'; 5' x 46'; 5' x 50'; 70" x 40'; 6' x 50'; 9' x 80'

KETTLES
9—Stainless Steel, 100# jkt. 50 to 500 gal.
12—Stainless Clad, 40# jkt. 30 to 80 gal.
5—Copper jktd, to 250 gal.
1—Steel, Jktd, 350 gal.
1—Steel Cooker, 15,000 gal, coils & agit.
1—Steel Cooker, 4600 gal, jktd & agit.

MILLS
1—Hardinge Cont. Conical Ball, 4'6" dia x 24", 25 HP met.
3—Abbe Pebble: 6' x 9'; 36" x 12"
2—Abbe & Day two-jar
1—U. S. Colloid 6", stainless rotor
1—Premier Colloid U3, 6" stainless rotors
2—Thropp 2-roll Plastic, 18" x 30"
3—Ross & Kent 3-roll Paint, 18" x 40"
4—Sprout Waldron Attrition, 18", 30", 30"
1—Robinson Attrition 22"
2—Williams Hammer, #1

STAINLESS TANKS 30 gal. to 500 gal. sizes from stock

Our fabricating division can make stainless tanks to your specifications

MIXERS
9—Horiz Dry Powder 200# to 3500#
1—J. H. Day D-8 Horiz Spiral, jacketed, 170 gal
8—Conical Blenders 25# to 500#
1—Lancaster #4-EAG Intensive, 59" dia. enclosed stainless, w/motor and elev.
8—Jacketed Steel Mixing Tanks—to 2200 gal
7—Heavy Duty double arm jacketed—to 250 gal
1—J. H. Day #1½D single arm dough

PUMPS
8—Duriron Cent. 90 GPM @ 45'
14—Stainless Sanitary Cent.—Tri-Clover
1—Hydroseal Slurry 4" x 4"
1—Worth. Vacuum, 6½ x 6, 62 CFM
8—Bronze Rotary Gear: ½", ¾", 1", 1¼"
20—Aurora Bronze Turbine, var. size
2—Bronze Cent. Mot. 200 GPM—230'
40—Bronze Cent. from 35 GPM @ 35' to 150 GPM @ 150'

EVAPORATORS
1—Triple Effect, steel tube, 5000 sq. ft.
1—Single Effect, steel, 55 sq. ft. coils
1—Copper Vac. Pan 6' dia x 10', Jktd. coils, gooseneck, condenser
2—Copper Vac. Kettles, 100 gal, jktd. agit.
1—Stainless Vac. Pan 5' dia x 10'

FILTERS
1—Rotary Vac. 8' x 8' Acid Proof, rubber & lead
1—Rotary Vac. 8' x 6' stainless
1—Rotary Vac. 6' x 3' steel
1—Sweetland #10, C.I. Body, 53 bronze leaves on 2" centers
5—Pl & Fr. Cast iron: 24" to 42"
3—Pl & Fr. Bronze: 10" to 30"
5—Pl & Fr. Lead: 12" & 18"
3—Pl & Fr. Wood: 18" & 30"
1—Recessed Plate, C.I., 36"
8—Bowser & Industrial Pressure Leaf—to 344 sq. ft.
5—Kiefer Pulp, #1 & #2
Also Disc, Pot, Stone and multi tube filters

STILLS
1—Jewell Water 250 GPH
1—Copper, Jktd, 500 gal. w/cond.
2—Copper Vac. 100 gal, Jktd & agit.
1—Aluminum, 175 gal. coils

TANKS
33—Glass Lined, 7500 & 8250 gal
12—Jktd Glass Lined, 1000, 1450, 1800 gal
6—Lead and Rubber Lined, to 7500 gal
30—Aluminum: 50, 100, 150 gal
19—Wood: 3600 to 13,000 gal
16—Copper: 8,000 to 11,000 gal
1—Stainless 6000 gal, agit, jktd.
3—Stainless 1000, 1500, 2500 gal.

MISCELLANEOUS
8—Rotary 16-punch pellet presses
2—Louisville Cont. Roller Presses, 24" & 36"
1—Davenport Rot. Grains Press 3A
4—Tank Scales, 2000# & 3000#
2—Steam Turbines, 8 & 10 HP
3—Stainless Gate Valves, 4", NEW
1—Stokes 43A Cecil, Granulator
2—Mikro Pulverizers #1, #2
2—Schutz O'Neill Pulverizers—18", 22"
15—Copper Columns—var. sizes
1—Steel Bubble Cap Column—69' high—28 plates

WRITE FOR COMPLETE STOCK LIST

BOTTLING CANNING MACHINERY PERRY SUPPLIES PROCESSING

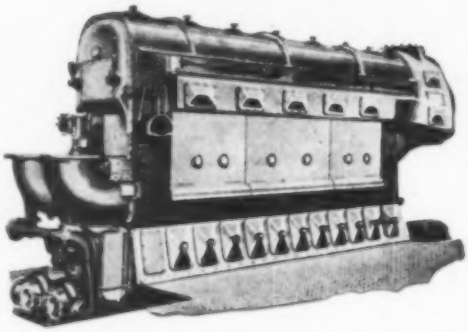
PERRY EQUIPMENT CORP.

1513 W. THOMPSON STREET • PHILA. 21, PA.

Phone: STevenson 4-1515 Cable: "Peri"

DIESEL ENGINE-GENERATOR SETS, Diesel Engines all Capacities

ANOTHER ONE OF OUR SPECIALTIES

DIESEL  **POWER**

Anything in Power Plant Equipment

Send for Bulletin 320

Above cut shows our 1600-HP. Fairbanks-Morse OP. Diesel Engine: Several in Stock. Have 1250-KVA., NEW Generators. Shaft Exciters and Switchboards. for Complete Units @ 50% of Today's prices for *IMMEDIATE DELIVERY.*

Several Cooper-Bessemer 600-HP. Diesels also in Stock.

Send Us Your Specifications for Anything in Diesels

Always Get Charles Weaver's prices: Are Money Savers.

TURBINE-GENERATORS We carry one of the Largest Stocks of Turbo-Generators of any firm in the USA. Investigate: Prices Right.

BOILERS: SEVERAL 400# NEW COMBUSTION BOILERS IN STOCK: PRICED TO SELL

Your Cooperation Invited

PHONE WIRE OR WRITE

CHARLES WEAVER

Electrical & Mechanical Engineer

41st Floor, Penobscot Building Detroit 26, Michigan

Telephones:
Woodward 1-1340
" 1-1341
" 1-6038

BOILERS and **SUGAR MACHINERY**
NEW, USED OR REBUILT
Specially Used Babcock-Wilcox Boilers from 100 HP to 850 HP
WRITE TO
ARG CHEMICAL MACHINERY
F. S. 7137 Chemical Engineering
330 W. 42nd St., New York 18, N. Y.

Reeves No. 55 Vari Speed motor pulley disc assembly, reducer type motor base and rubber belt 72". 12" dia. flat face pulley. Capacity 5 HP motor at 1740 RPM is maximum 1670 RPM and minimum 557 RPM. Capacity 3 HP motor at 1160 RPM is maximum 1113 RPM and minimum 371 RPM ..... **Price—$200.00**

Drag Line Elevator 11' 6" centers, 10" x 16" steel casing—7½" x 2" dragline with chain, 3½" centers, 28" x 36" steel hopper, 30" deep to centerline of 7" screw conveyor. Elevator is driven by 1½ HP 220/440 V 1200 RPM 60 cycle 3 phase motor, through sprockets and silent chain. Motor is mounted on top of elevator. Feed is through side of elevator bottom. Discharge is through side of elevator top. **Price—$400.00**

MINERAL PIGMENTS CORP.
MUIRKIRK, MARYLAND

For Sale—Feinc Filter
3 ft. Diam. & 1 ft. face, 304 Stainless Steel complete with drive, Vacuum pump & Receiver.
THE BORDEN COMPANY
Chemical Division Bainbridge, N. Y.

"SEARCHLIGHT"
IS
Opportunity Advertising
—to help you get what you want.
—to help you sell what you no longer need.
Take Advantage Of It
For Every Business Want
"THINK SEARCHLIGHT FIRST"

FOR SALE
3—74,000 BBL. CAP.
STEEL STORAGE TANKS
DARIEN CORP.
60 E. 42nd St., New York 17, N. Y.

DRYING OVEN
Gehnrich and Gehnrich 24' x 12'6" x 7'6" high, with heating and ventilating system, cooling unit, thermostatic control and indicating thermometer. 24 drying trucks optional. Excellent condition. Location: Metropolitan New Jersey. Please reply to
FS-7580, Chemical Engineering,
330 West 42nd Street, New York 18, N. Y.

What Makes A Mailing Click?

● *Advertising men agree —the list is more than half the story.*

McGraw-Hill Mailing Lists, used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power. They offer thorough horizontal and vertical coverage of major markets, including new personnel and plants. Selections may be made to fit your own special requirements.

New names are added to every McGraw-Hill list daily. List revisions are made on a twenty-four hour basis. And all names are guaranteed accurate within two per cent.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want. Ask for more detailed information today. You'll probably be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

McGraw-Hill Publishing Co., Inc.
DIRECT MAIL DIVISION
330 WEST 42nd ST.
NEW YORK 18, N. Y.

SAVE TIME...SAVE MONEY...
get a quotation from--

Chicago Stainless

Designers and manufacturers of all types of storage, refrigerating, and processing equipment for the milk, food and chemical industries.

Three 300 gallon Chicago Stainless ice cream mix flavoring tanks.

EVERY UNIT CUSTOM BUILT
—at a competitive price

When you order equipment from Chicago Stainless you know it will be engineered to meet YOUR specifications . . . and . . . custom built to fill YOUR job requirements — without costing one dollar extra. You'll save time and money by getting a quotation from Chicago Stainless. No obligation. Write TODAY.

Here are just a few of the various types of equipment made by Chicago Stainless:
Processing Tanks
Storage Tanks
Jacketed Kettles
SEND FOR THIS
Chicago Stainless
new illustrated catalog NOW

Silicone News

DC CORNING

First in Silicones

Foremost in Silicon chemicals

Our leadership in the field of silicone chemistry is founded on more than 15 years of research and development; reinforced by more than 5 years of experience in the commercial production of silicone products and silicon chemicals. Most of our time has been spent in the development of new silicone products and in adapting them to a wide variety of industrial uses. Hence, it is still news to many chemists that we have also been producing and selling organo-silicon chemicals in very substantial quantities.

Dow Corning operates the largest Grignard plant in the world. This versatile process and other processes developed by our chemical engineers enable us to produce the widest variety of silicone products and organo-silicon chemicals.

We invite you to inquire about any of the silicon chemicals listed below:

CHLOROSILANES
- Methyltrichlorosilane
- Dimethyldichlorosilane
- Trimethylchlorosilane
- Ethyltrichlorosilane
- Diethyldichlorosilane
- Dodecyltrichlorosilane
- Hexadecyltrichlorosilane
- Octadecyltrichlorosilane
- Phenyltrichlorosilane
- Diphenyldichlorosilane
- Triphenylchlorosilane

ALKOXYSILANES
- Methyltriethoxysilane
- Dimethyldiethoxysilane
- Trimethylethoxysilane
- Tetraethoxysilane

SILOXANES
- Hexachlorodisiloxane
- Hexamethyldisiloxane

ORGANOSILANES
- Tetramethylsilane
- Tetracresoxysilane

SILAFLOLS
- Diphenylsilanediol
- Triphenylsilanol

Write to Dow Corning for more information about any of the organo-silicon chemicals.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Atlanta • Chicago • Cleveland • Dallas
Los Angeles • New York

Dow Corning
FIRST IN SILICONES

ADVERTISERS IN THIS ISSUE

Abbe, Inc., Paul O. 184
Acme Coppersmithing & Mach. Co. 174
Adams Co., Inc., R. P. 263
Aerofin Corp. 262
Allegheny Ludlum Steel Corp. 62
Allen Bradley Co. 341
Allis Chalmers Mfg. Co. 75, 213
Alloy Steel Products Co., Inc. 15
All Metal Screw Products Co. 290
Aluminum Co. of America 50, 84
American Air Filter Co., Inc. 287
American Brass Co. 330-331
American Car & Foundry Co. Valve Div. 321
American Cyanamid Co. 79
American Gas Association 251
American Hard Rubber Co. 31
American Mach. Metals Inc., DeBothezat Fans Div. 305
Tolhurst Centrifugal Div. 168
American Metal Hose Branch, American Brass Co. 313
American Mineral Spirits Co. 285
American Optical Co. 303
American Pulverizer Co. 188
American Tool & Mach. Co. 85
American Structural Products Co. 193
American Wheelabrator & Equip. Corp. 56
Amerail Co., Inc. 194
Armstrong Machine Works 163
Atlas Powder Co. 211
Automatic Sprinkler Corp. of America 152

Babcock & Wilcox Tube Co. 47
Badger & Sons Co., E. B. 73
Bagpak Div. of International Paper Co. 169
Bailey Meter Co. 195
Baker & Co., Inc. 253
Baker Perkins, Inc. 153
Baldwin-Hill Co. 6
Bell Telephone Laboratories 46
Bemis Bro. Bag Co. 207
Bethlehem Foundry & Mach. Co. 337
Bird Machine Co. 9
Black, Sivalls & Bryson Inc. 77
Blaw Knox Co. 35
Blickman, Inc., S. 286
Boston Woven Hose & Rubber Co. 23
Bowen Engineering Inc. 210
Bridgeport Brass Co. 245
Brown Instrument Co. 37
Brown & Root Marine Operators Inc. 265
Buell Engrg. Co. 146
Buffalo Forge Co. 171
Buffalo Wire Works Co. Inc. 162
Buflovak Equipt. Div. of Blaw-Knox Co. 12
Byron Jackson Co. 225

Cambridge Wire Cloth Co. 292
Carbide & Carbon Chemicals Corp. 5
Carpenter Steel Co. 328
Cash Co., A. W. 131
Cash Valve Mfg. Co., A. W. 284
Catawissa Valve & Fittings Co. 196
Ceilcote Co. 334
Celanese Corp. of America 59
Century Elec. Co. 18
Chapman Valve Mfg. Co. 291
Chemical Construction Corp. 247
Chicago Bridge & Iron Co. 311
Chicago Metal Hose Corp. 339
Chicago Stainless Equipment Corp. 355
Clark Equipment Co. 160
Climax Engineering Co. 267
Cochrane Corp. 292
Cole Mfg. Co., R. D. 282
Commercial Solvents Corp. 158
Consolidated Siphon Supply Co., Inc. 302
Coppus Engrg. Corp. 13
Corning Glass Works 326-327
C-O-Two Fire Equipment Co. 148
Cowles Co. 335
Crane Co. 137
Crouse Hinds Co. 91

Darling Valve & Mfg. Co. 255
Davidson Chemical Corp. 203
DeBothezat Fans Div., American Mach. Metals Inc. 306
DeLaval Separator Co. 149
DeLaval Steam Turbine Co. 178, 217
Deming Co. 238
Diamond Alkali Co. 249
Dings Magnetic Separator Co. 312
Dicalite Co. 242
Dixie Machinery Mfg. Co. 220
Dodge Mfg. Corp. 54
Dorr Co. 219
Dow Chemical Co. 198
Dow Corning Corp. 356
Downingtown Iron Works 339
Dracco Corp. 258
Duraloy Co. 260
Duriron Co., Inc. 233

Ebasco Services Inc. 322
Elliott Co. 360
Enjay Co., Inc. 17
Eppenbach, Inc. 282
Esso Standard Oil Co. 297

Fairbanks, Morse & Co. 141
Fansteel Metallurgical Corp. 38
Farrell Birmingham Co., Inc. 19
Filtration Engineers, Inc. 274
Fletcher Works 322
Floridin Co. 202
Foster Wheeler Corp. 229
Foxboro Co. ..... Inserted between 50-51
Frederick Iron & Steel, Inc. 176
Fuller Co. 215
Fulton-Sylphon Co. 235

Gardner Denver Co. 283
Gates Engineering Co. 216
General Amer. Transp. Corp. 143, 272-273, 275
General Aniline & Film Corp. 334
General Ceramics & Steatite Corp. 266
General Chemical Div. Allied Chemical & Dye Corp. 149
General Electric 26-27, 48-49, 157
General Electric X-Ray Corp. 239
General Machine Co. of New Jersey 210
Globe Steel Tubes Co. 281
Goslin Birmingham Mfg. Co., Inc. 186
Graphite Metallizing Corp. 244
Greene, Tweed & Co. 270
Grinnell Co., Inc. 154
Griscom Russell Co. 316

Hagan Corp. 191
Hammel-Dahl Co. 83
Hardinge Co. Inc. 206
Haveg Corp. 348
Haynes Stellite Co. 4
Hays Corp. 192
Hersey Mfg. Co. 222
Hewitt Rubber Div. Hewitt-Robins Inc. 271
Heyden Chemical Corp. 161
Homer Mfg. Co., Inc. 248
Homestead Valve Mfg. Co. 52
Hooker Electrochemical Co. 89
Howell Electric Motors Co. 45

Illinois Elec. Porcelain Co. 180
Industrial Process Engrs. 268
Ingersoll Rand 16
International Engrg. Inc. 309
International Nickel Co. 44, 293
International Paper Co., Bagpak Div. 169

Jackson & Church Co. 192
Jeffrey Mfg. Co. 34
Jenkins Bros. 179
Johns-Manville 294

Keasbey & Mattison Co. 78
Kelley, O. C. & Co. 24
Kemp Mfg. Co., C. M. 208
Kennedy Valve Mfg. Co. 214
Kidde & Co., Inc., W. 343
Klein Filter & Mfg. Co. 340
Knight, Maurice A. 310

LaBour Co., Inc. 36
Ladish Co. ..... Inserted between 328-329
Lapp Insulator Co., Inc. 187
Lawrence Mach. & Pump Corp. 190
Layne & Bowler, Inc. 256
Lee Metal Products Co., Inc. 264
Leeds & Northrup Co. 90
Link Belt Co. 11
Liquidometer Corp. 284
Lubriplate Div. Fiske Bros. Refining Co. 212
Lukens Steel Co. 8, 199
Lukenweld Div. Lukens Steel Co. 199
Lunkenheimer Co. 304

Maneely Chemical Co. 305
Manning, Maxwell & Moore Inc. 246
Manning & Lewis Engrg Co. 358
Marsh Stencil Machine Co. 338
Master Elec. Co. ..... 3rd Cover
McCarthy Chemical Co. 151
McGraw-Hill Book Co. 276
Mears Kane Ofeldt, Inc. 218
Merrick Scale Mfg. Co. 338
Metal Products Corp. 280
Metal Glass Products Co. 307

Attention—Manufacturers of Sulphuric Acid • • •

Small Kelly Pressure Filter, jacketed type, for handling molten sulphur going to burners.

1 • • • Do you want to be SURE that the molten sulphur going to burners is CLEAN?

2 • • • Do you want to eliminate frequent cleaning of melting pits?

We Recommend the KELLY PRESSURE FILTER for This Purpose

This filter long ago proved its effectiveness in removing foreign matter from molten sulphur, especially carbonaceous matter, at two large mines where "Dark" Sulphur is processed into "Bright" Sulphur by the clay contact bleaching method. At another, crude run-of-mine Sulphur is cleaned of suspended carbonaceous matter. Here two 450 sq. ft. Kellys handle upwards of 3000 long tons molten sulphur per day.

The Kelly Filter offers two special advantages for cleaning sulphur going to the burner: (1) it can be properly jacketed for operating at the desired temperature of 280-290°F. (2) it is designed for quick cake discharge.

We have Kelly Filters especially designed for this purpose in the following sizes 3, 10, 25 and 50 sq. ft. We shall be glad to recommend the proper size to meet your requirements.

OLIVER UNITED FILTERS INC.

New York 18, N. Y.
33 West 42nd Street

San Francisco 11, California

Chicago 1, Ill.
221 N. LaSalle Street

Western Sales Division
Oakland 1, California
2900 Glascock Street

Sales and Manufacturing Representative:
E. Long Limited
Orillia, Canada

Factories: Oakland, Calif. • Hazleton, Pa. • Orillia, Canada • Melbourne, Australia

M&L *Hurry! Hurry!*
H-U-R-R-Y!

WHETHER you're a carnival barker or a customer, speed is sometimes essential. We at M&L can't help carnival barkers, but we can meet a need for speed.

YEARS OF EXPERIENCE have taught us how to h-u-r-r-y, but you may be assured that the finishing touch to every job—even your rush job—will be the M&L motto:

"BETTER Construction means BETTER Performance . . . LONGER LIFE!"

Evaporator Body, 80% nickel-clad steel. Made for one of America's leading paper and fibre corporations

For dependable process and heat exchange equipment, custom-built to code or to your specifications, M&L is the name to remember. Write TODAY! We welcome your inquiries.

MANNING & LEWIS ENGINEERING CO.
DESIGNERS-FABRICATORS
40 Ogden Street • Newark 4, N. J.

PROCESSED
AMOSITE
ASBESTOS
FIBRES

•

FOR FILTRATION, PLASTIC REINFORCEMENT AND OTHER INDUSTRIAL USES

Amosite is an extremely long acid resistant asbestos fibre mined in South Africa. It is especially suitable for filtration and similar processes. Available in various grades and degrees of opening to meet specific requirements.

UNION ASBESTOS & RUBBER CO.

UNARCO

1821 S. 54th AVE., CICERO, ILL.

ADVERTISERS IN THIS ISSUE

Metalsmiths Div. of Orange Roller Bearing Co. Inc. 218
Midwest Piping & Supply Co., Inc. 86-87
Midvale Co. 325
Mitchell & Co. Inc., W. K. 256
Mixing Equipment Co., Inc. 71
Modine Mfg. Co. 277
Monarch Mfg. Works, Inc. 290
Moore Products Co. 17
Monsanto Chemical Co. 60-61
Morris Machine Works 170
Mt. Vernon Woodberry Mills 43
Multi Metal Wire Cloth Co., Inc. 188

Nash Engrg. Co. 241
National Airoil Burner Co., Inc. 257
National Carbon Co., Inc. 230
National Engrg. Co. 147
National Filter Media Co. 288
National Radiator Co. 197
Neville Co. 181
New England Tank & Tower Co. 194
Niagara Blower Co. 200
Nicholson & Co., W. H. 248
Nordstrom Valve Div., Rockwell Mfg. Co. 32-33
Northern Indiana Brass Co. 30
Nukem Products Corp. 252
Norwalk Co. Inc. 234

Ohio Injector Co. 28
Oklahoma Planning & Resources Board 204
Oliver United Filters Inc. 357
Owens Corning Fiberglas Corp 22

Pangborn Corp. 232
Patterson-Kelley Co., Inc. 296
Pennsylvania Flexible Metallic Turbine Co. 299
Pennsylvania Industrial Chem. Corp. 269
Pennsylvania Salt Mfg. Co 29
Permutit Co. 136
Pfaudler Co. ..... Back Cover
Pfizer & Co., Inc., Chas 314
Phila. Gear Works, Inc. 339
Photoswitch Inc. 212
Pipe Fabrication Institute 145
Pittsburgh Coke & Chem. Co. 82
Pittsburgh Lectrodryer Corp. 336
Powell Co., Wm. 68-69
Power Products Co. 244
Pressed Steel Tank Co. 279
Procter & Schwartz Inc. 63
Pulverizing Mach. Co. 164

Raymond Pulverizing Div. Combustion Engrg. Co., Inc. 138
Reading Pratt & Cady Div. Amer. Chain & Cable Co. 85
Reeves Pulley Co. 65
Reliance Electric & Engineering Co. 185
Republic Steel Corp. 20
Revere Copper & Brass, Inc. 10
Richardson Scale Co. 301
Roots-Connersville Blower Corp. 190
Roth Co., Roy E. 246
R-S Products Corp. 205
Ryerson & Son, Inc., J. T. 182

Saran Pipe Co. 198
Sarco Co. Inc. 39
Schneible Co., C. B. 278
Schutte & Koerting Co. 80
Secon Metals Corp. 246
Shell Chemical Corp. 21
Shriver & Co., Inc., T. 306
Sier Bath Gear & Pump Co., Inc. Pump Div. 236
Silas Mason Co. 264
Solvay Sales, Div., Allied Chem. & Dye Corp. 55
Sparkler Mfg. Co. 254
Spencer Chem. Co. 250
Sperry & Co., D. R. 190, 237
Spray Drying Service 338
Springdale Finishing South, Inc. 302
Sprout Waldron & Co. 298
Stacey Bros. Gas Construction Co. 14
Standard Conveyor Co. 240
Standard Oil Co. (Indiana) 227
Standard Steel Corp. 270
Stanley Co., Inc., Wm. W. 320
Stokes Machine Co., F. J. 76
Struthers Wells Corp. 64
Sturtevant Mill Co. 289
Sutton, Steele & Steele, Inc. 250
Swenson Evaporator Co. 88

Taber Pump Co. 278
Tagliabue Corp., C. J. of N. J. 42
Taylor Forge & Pipe Works 53
Taylor Instruments Co. 332-333
Texas Gulf Sulphur Co., Inc. 228
Timken Roller Bearing Co., Roller Bearing Div. 81
Tolhurst Centrifugals Div. Amer. Mach. & Metals Inc. 168
Traylor Engrg. & Mfg. Co. 7
Tri-Clover Machine Co. 167
Tube Turns Inc. ..... Second Cover

Union Asbestos & Rubber Co. 338
Union Carbide & Carbon Co. 4, 5
U. S. Steel Supply Co. 223
U. S. Industrial Chemical Inc. Inserted between 34-35
U. S. Stoneware Co. 66

Vapor Recovery Systems Co. 308
Viking Pump Co. 276
Virginia Smelting Co. 264
Vogt Machine Co. Inc., Henry Inserted between 328-329
Vulcan Iron Works 259

Walworth Co. 189
Weineman Pump Mfg. Co. 172
Western States Machine Co. 144
Weston Elec. Instrument Corp. 226
Wheeler Mfg. Co., C. H. 323
Wickwire Spencer Div. Colo. Fuel & Iron Corp. 319
Wiegand Co., Edwin L. 177
Wilfley & Sons, A. R. 261
Williams Pat. Crush. & Pulv. Co. 166
Wilson Products, Inc. 300
Wing Mfg. Co., L. J. 224
Wolverine Tube Div. Calumet & Hecla Consolidated Copper Co. 57
Worthington Pump & Machine Corp. 40, 211
Wyandotte Chemical Corp. 58

Yarnall Waring Co. 41

PROFESSIONAL SERVICES 342

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant 344
Selling Opportunities Offered 344
Employment Agencies 344
Employment Services 344
SPECIAL SERVICES 344
BUSINESS OPPORTUNITIES
Offered 344
PROPERTY
For Sale 442
Wanted 442
EQUIPMENT
(Used or Surplus New)
For Sale 344-354
WANTED
Equipment 344
Miscellaneous 344

ADVERTISERS INDEX

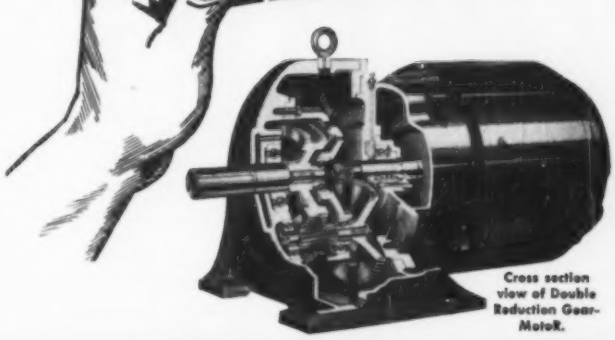
Allen Sons Co., William 353
American Air Compressor Corp. 350
Barcan Co., Irving 348
Blockson Chemical Co. 344
Borden Co. 354
Brill Equipment Co. 346
Buchman Laboratories, Inc. 352
Carll Sons, Charles W. 344
Carr Bros. 344
Castle & Associates Inc. 344
Chemical Service Corp. 344
Chicago Electric Co. 350
Cia de Productos Quimicos 352
Cochrane Chemical Co. 352
Consolidated Products Co., Inc. 345, 348
Darien Corp. 348, 352, 354
Electric Equipment Co. 348
Emsco Equipment Co. 347
Equipment Finders Bureau 344
Equipment Trading Post 344
First Machinery Corp. 351
Gelb & Sons Inc., R. 349, 351
Hammer & Assoc., Milton 353
Heat & Power Co., Inc. 352
Johnson, R. H. 348
Kehoe Machinery Corp., Lester 348
Lawler Company 346
Lestan Corp. 353
Loeb Equipment Supply Co. 351
Loeb & Son, H. 348
Lowell Tank & Machinery Co. 352
Machinery & Equipment Corp., The 350
Mahoney-Machinery 352
Mineral Pigments Corp. 354
Perry Equipment Corp. 353
Petoskey Portland Cement Co. 344
Pittsburgh Metallurgical Co., Inc. 350
Rogers & Wright Inc. 351
Shay Employment Agency 344
Stanhope Inc., R. C. 346, 351
Stein Equipment Co. 350
Thompson Co., J. Parker 351
Truland Chemical & Engrg. Co., Inc. 344
Union Standard Equipment Co. 348
Wagner Co., Arthur 346
Weaver & Co., Charles 334

FOR THOSE WHO ARE INTERESTED IN COMPACT, FLEXIBLE SPEED REDUCTION . . .

HERE'S THE NEW BOOK THAT GIVES THE ANSWERS

The Philadelphia GearMotoR is is a self-contained, *extremely compact* unit that conforms to the recommended standards of the American Gear Manufacturers Association and National Electrical Manufacturers Association. . . . Available in single, double and triple reductions. . . . Range of speeds: 780 through 7.5 R.P.M. Motor Rating from 1 H.P. through 60 H.P. . . . A-c or D-c.

Truly the "last word" in flexible speed reduction. Send for new 42 page illustrated catalog, which contains full information and data necessary for ordering.



Cross section view of Double Reduction GearMotoR.

Philadelphia Gear Works, INC.

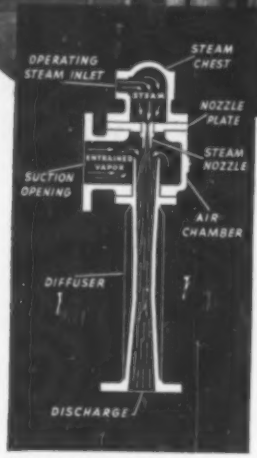
ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

DEODORIZING too, calls for Elliott STEAM JET EJECTORS



Single ejector stage showing method of operation. Stages may be combined with or without intercondensers in units up to five stages, where very low absolute pressures are required.

In the preparation of their nationally famous vegetable oil food products, the Blanton Company, St. Louis, Mo., uses this Elliott three-stage booster ejector to provide the high vacuum required in their deodorization process. Installed on the roof of the oil refinery, a catchall is connected between the suction of the booster ejector and the vapor outlet of the deodorizer.

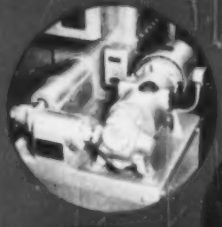
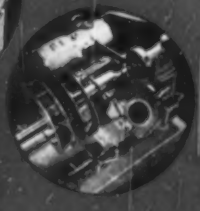
Elliott steam jet ejectors are widely used in all process industries requiring vacuum. The dependability of their operation assures excellence and uniformity of product, while their low maintenance and ease of application help to minimize costs. Elliott engineers are soundly experienced in fitting the vacuum set-up to the operating conditions and requirements, and their co-operation is at your service.

G-405

Elliott COMPANY

***Heat Transfer Dept.*, JEANNETTE, PA.**

Plants at: JEANNETTE, PA. • RIDGWAY, PA.
SPRINGFIELD, O. • NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

On thousands of applications, stepless variable speed operation assures exactly the right speed for every operation . . . for each operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a better quality product and more efficient performance of your equipment and your operators.

variable speed operation doesn't cost

IT PAYS

Master Speedrangers provide this infinitely variable speed in compact, all-metal, mechanical variable speed units in a wide range of types and sizes up to 5 horsepower.

See how the Speedrangers on the applications shown incorporate an electric motor, a variable speed unit, a gear reduction, and an electric brake . . . all standard Master units that easily combine into a compact, integral power drive. This provides exactly the right speed, the right features, in a unit that you can use right where you want it.

Write for Data 7525, a new 24-page book on Speedrangers, and see what a real job they can do for you.

MASTER SPEEDRANGERS

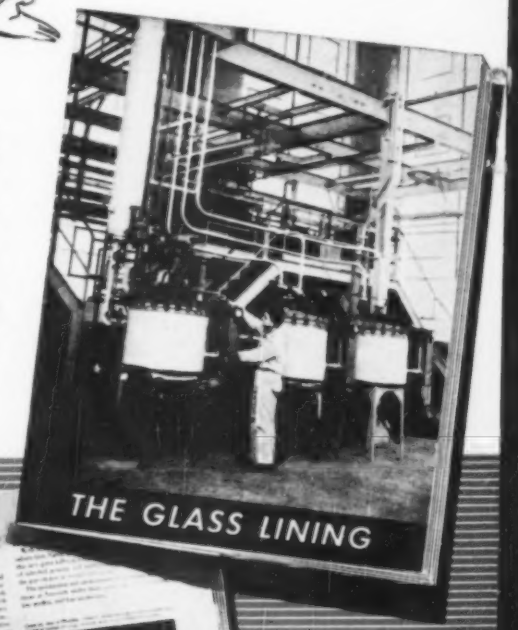
THE MASTER ELECTRIC COMPANY · DAYTON 1, OHIO

Are YOU getting this free engineering and service publication?

THE GLASS LINING, published quarterly by The Pfaudler Co. since 1924, was conceived in the interest of aiding those in the process industries to obtain maximum utility and longer service from Pfaudler and related lines of equipment.

Typical issues contain informative articles on such subjects as production short cuts, process agitation, heat transfer, properties of Pfaudler glasses, corrosion, special equipment, unusual installations in the chemical, drug, pharmaceutical, food, dairy, beverage, and allied industries.

All qualified personnel serving these industries are welcome to copies of THE GLASS LINING. There is no obligation. The latest issue (just off the press) is yours for the asking. Write or use coupon below.



Pfaudler

THE PFAUDLER CO., ROCHESTER 3, N.Y.

ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT

Glass-Lined Steel . . . Stainless Steels . . . Nickel . . . Inconel . . . Monel Metal

THE PFAUDLER CO., Dept. CE 1, Rochester 3, New York

Please add my name to your mailing list for THE GLASS LINING ☐ Send copy of latest issue.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____